

## Isopod crustaceans from Shikoku, western Japan-1, specimens from Echime Prefecture

journal or publication title	Bulletin of the Toyama Science Museum
number	37
page range	19-78
year	2013-06-25
URL	<a href="http://repo.tsm.toyama.toyama.jp/?action=repository_uri&amp;item_id=996">http://repo.tsm.toyama.toyama.jp/?action=repository_uri&amp;item_id=996</a>

## Isopod Crustaceans from Shikoku, western Japan-1, Specimens from Ehime Prefecture \*

Museum of Medicine Peddlers, Toyama Municipal Folkcraft Village  
980 An'yobo, Toyama-shi, 930-0881 Japan

### 四国産等脚目甲殻類-1 愛媛県産標本

布村 昇

富山市民俗民芸村売薬資料館  
930-0881 富山市安養坊980

四国地方の等脚目甲殻類の解明は海産、陸産、淡水産とも比較的遅れており、従来報告が少なかった。近年、海産種については2011年から黒潮生物研究財団の「四国地方の海浜の等脚目甲殻類の分類学的研究」に従事しており、2012年6月2日から6月4日にかけて愛媛県の幾つかの場所で調査を実施した。また、2012年4月6日から10日にかけて愛媛県RDBのための調査を愛媛県内で実施した。さらにまた小田深山の山本森林生物研究所の山本栄治氏、松山東雲女子大学の石川和男氏、鳥取大学の鶴崎展巨氏はじめ多くの科学者の採集になる標本を調査した。加えて富山市科学博物館の所蔵の愛媛県産標本の当該種を調査・記録した。

調査標本はこのように大きく調査の黒潮生物研究所の生物調査、愛媛県RDB調査、富山市科学博物館収蔵標本ならびに永田樹三博士や全国の研究者から同定依頼や寄贈されたものである。

なお、一連の調査で11種の新種(うち、3種が水生種、8種が陸生種)が見出されたので報告する。新種のアホタイプは富山市科学博物館におかれ、パラタイプは富山市科学博物館のほか、愛媛大学ミュージアム、北九州市立歴史・自然史博物館にならびに大阪市立自然史博物館で保管される。また、3種については再記載を行い、種まで同定できなかった2種についても形態を観察して記した。その他の標本は富山市科学博物館に保管され、陸産の一部は愛媛県総合科学博物館、海産種の一部は高知県の黒潮生物研究所等に保管される。

キーワード：等脚類、新種、愛媛県、四国、分類学

**Key words** : new species, Ehime, Shikoku, taxonomy, Isopod

Hitherto, isopod fauna of Shikoku District, western Japan have been ignored (Nunomura, 2000; Saito et al. 2000). Recently, I had a chance to collect samples at many places of Ehime Prefecture and to examine specimens of the isopod crustaceans from Ehime Prefecture, deposited at Toyama Science Museum and ones which some scientists sent me for my study. As the first report of a series of studies of isopods in Shikoku District, I will report on the results of the specimens including 11 new to science from Ehime Prefecture. The type series is deposited at Toyama Science Museum, Toyama (TOYA), Ehime University Museum, Osaka Museum of Natural History(OMNH) and Kitakyushu Museum of Natural History and Human History, Kitakyushu (KMNH). Size of specimens is indicated by the body length (BL) measured from the midpoint of the anterior margin of the head to the midpoint of the posterior margin of the pleotelson.

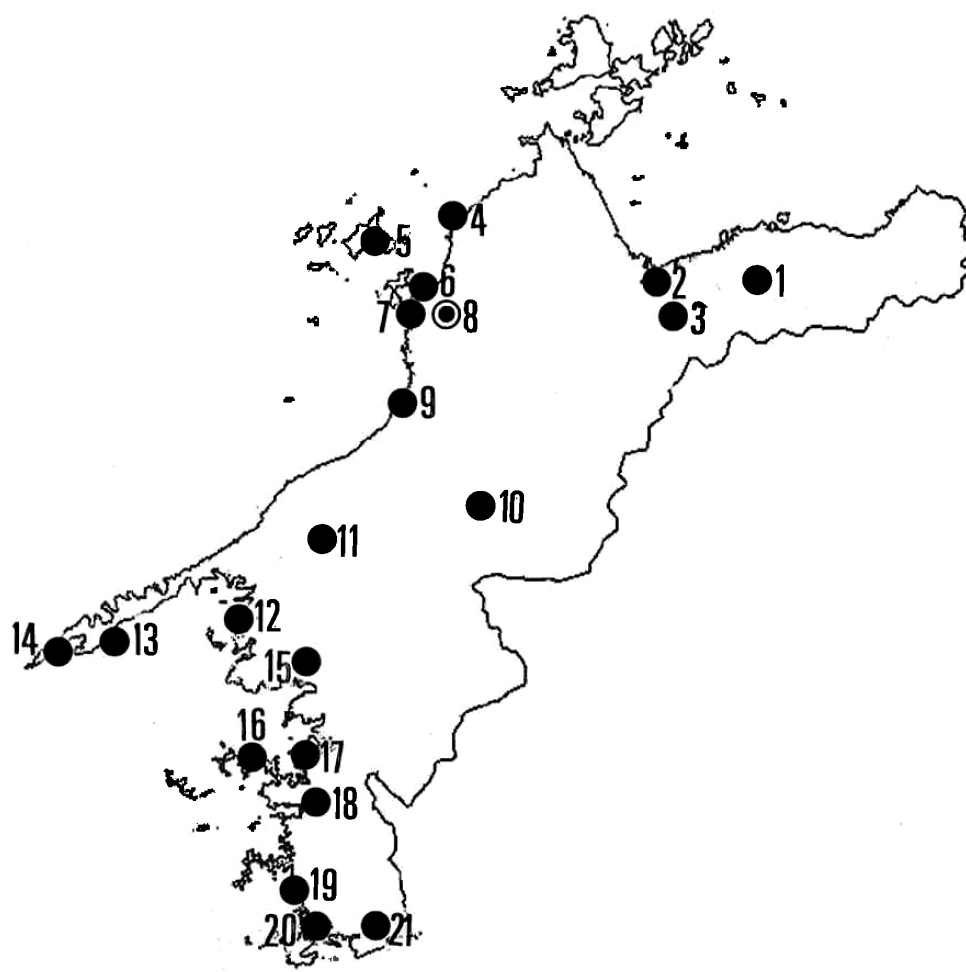
---

\* Contributions from Toyama Science Museum, No. 446

**Oder Isopoda**  
**Suborder Oniscidea**  
**Family Ligiidae**  
*Ligia exotica* Roux, 1828  
 (Japanese name: Funamushi)

*Ligia exotica* Roux, 1828, p. 3, pl. 13, fig. 9.

*Material examined*: 1ex, Kashima, Hojo-shi, 6, Oct.1991, (TOYA Cr-11556), 1ex, Takahama, Matsuyama-shi, 8, Oct. 1991, coll. Noboru, (TOYA Cr-11100), 2♀♀2 youngs, Kuroiwa, Baishinji-cho, Matsuyama-shi, 4, Nov. 2011, coll. Kazuo Ishikawa; 1♂, Sunokawa, Ainan-cho, 3, June 2012, coll. Noboru Nunomura; 1♂1♀, Misho-hirajo, Ainan-cho, 3, June 2012, coll. Noboru Nunomura; 3♀♀, Iekushi, Ainan-cho, 3, June 2012, coll. Noboru Nunomura; 4♀♀, Muei-misaki, Kikizu, 2, June 2012, coll. Noboru Nunomura; 1♂, Osumi, Beach Park, Namikata-cho, Imabari-shi, 28, Sep. 2011, coll. Nobuo Tsurusaki.



**Fig.1 Map showing main sampling sites.**

- 1, Tachikawa (Niihama-shi); 2, Shiotorigawa, Teizui (Saijo-shi); 3, Nakano-kou (Saijo-shi);
- 4, Nami-tsumanohana, Ooura (Matsuyama-shi); 5, Nakajima(Matsuyama-shi);
- 6, Shiroishi-nohana, Katsuoka-cho (Matsuyama-shi); 7, Baishinji-machi (Matsuyama-shi);
- 8, Shiroyama (Matsuyama-shi); 9, Futami-cho (Iyo-shi); 10, Odamiyama (Uchiko-cho);
- 11, Tada (Oozu-shi); 12, Nezumi-jima(Yawatahama-shi); 13, Oohae(Ikata-cho);
- 14, Shono(Ikata-cho); 15,Uwacho-kamimatgsuba(Seiyo-shi); 16,Yusu(Uwajima-shi);
- 17, Kokubo(Uwajima-shi); 18, Tsushimacho-takata (Uwajima-shi); 19, Sunokawa (Ainan-cho);
- 20, Mishoumidoro (Ainan-cho); 21, Masuda (Ainan-cho).

***Ligia* sp. (aff. *ryukyuensis* Nunomura, 1983)**

*Material examined*: 2♂♂3♀♀, Futami-cho, Iyo-shi, 2, June 2012, coll. Noboru Nunomura; 1♀, Takagishi, Futami-cho, Iyo-shi, 2, June 2012, coll. Noboru Nunomura; 4♀♀, Tsuchinada, Futami-cho, Iyo-shi, 2, June 2012, coll. Noboru Nunomura.

***Ligidium* (*Nipponoligidium*) *japonicum* Verhoeff, 1918**

**(Japanese name: Nihon-himefunamsuhi)**

*Ligidium japonicum* Verhoeff, 1918 Verhoeff, pp.114-117, fig.8-9.

*Ligidium* (*Nipponoligidium*) *japonicum* Verhoeff, 1918; Nunomura, 2004, p19.

*Material examined*: 2♂♂2♀♀, Takada, Uwajima-shi, 3, June 2012, coll. Noboru Nunomura; 1♂5♀♀, Daieizan, Niihama-shi, 6, Apr. 2012, coll. Noboru Nunomura; 3♀♀, Tatsukawa-cho, Niihama-shi, 6, Apr. 2012, coll. Nunomura Noboru; 1♂1♀, Tatsukawa-cho, Niihama-shi, 6, Apr. 2012, coll. Haruko Ishikawa; 2♂♂1♀, Mt. Takanawa, *Fagus crenata*-forest litter, Matsuyama-shi, 22, Mar. 2011, coll. Nobuo Tsurusaki; 1♂2♀♀, Wakigafuchi Park (160 m alt.), *Quercus serrata* forest litter, Matsuyama-shi, 5, Mar. 2013, Nobuo Tsurusaki; 5♂♂33♀♀ (alt. 800m), Odamiyama, Uchiko-cho, 2, Oct. 1992, coll. Eiji Yamamoto; 2♂♂4♀♀, Hontani, Odamiyama, Uchiko-cho, 13, Sep. 1994, coll. Eiji Yamamoto; 1♀, Rakando, Cave, 11, Oct. 1990, coll. Shuhei Nomura; 3y, Hontani, Odamiyama, Uchiko-cho, 4, June, 1994, coll. Eiji Yamamoto; 7♀♀, Hontani, Odamiyama, Uchiko-cho, 5, May, 1994, coll. Eiji Yamamoto; 1♂2♀♀, Keikoku (valley), Odamiyama, Uchiko-cho, 10, June, 1994, coll. Eiji Yamamoto; 4♂♂4♀♀, Keikoku (valley), Odamiyama, Uchiko-cho, 25, Nov. 1995, coll. Eiji Yamamoto; 2♂♂12♀♀, Keikoku (valley), Odamiyama, Uchiko-cho, 4, May 1994, coll. Eiji Yamamoto; 11♀♀, Keikoku (valley), Odamiyama, Uchiko-cho, 1, May 1994, coll. Eiji Yamamoto; 12♀♀, Keikoku (valley), Odamiyama, Uchiko-cho, 25, Nov. 1995, coll. Eiji Yamamoto; 2♂♂4♀♀, Keikoku (valley), Odamiyama, Uchiko-cho, 30, Oct. 1995, coll. Eiji Yamamoto; 1♂4♀♀, Kidani, Odamiyama, Uchiko-cho, 2, Sep. 1994, coll. Eiji Yamamoto; 9♀♀, Kidani, Odamiyama, Uchiko-cho, 13, Nov. 1994, coll. Eiji Yamamoto; 3♂♂7♀♀, Kogasatoriyama, Odamiyama, Uchiko-cho, 4, June 1994, coll. Eiji Yamaoto; 2♂♂3♀♀, Koya-yama, Odamiyama, Uchiko-cho, 26, June, 1994, coll. Eiji Yamamoto; 3♀♀, Koya-yama, Odamiyama, Uchiko-cho, 8, Oct. 1994, coll. Eiji Yamamoto; 5♀♀, Koya-yama, Odamiyama, Uchiko-cho, 21, Oct. 1994, coll. Eiji Yamamoto; 1♂15♀♀, Koya-yama, Odamiyama, Uchiko-cho, 25, Sep. 1994, coll. Eiji Yamamoto; 2♀♀, Koya-yama, Odamiyama, Uchiko-cho, 2, Aug. 1995, coll. Eiji Yamamoto; 5♂♂11♀♀, Masagoya, Odamiyama, Uchiko-cho, 22, July 1994, coll. Eiji Yamamoto; 2♀♀2y, Masagoya, Odamiyama, Uchiko-cho, 2, May 1994, coll. Eiji Yamamoto; 16♀♀, Masagoya, Odamiyama, Uchiko-cho, 1, Aug. 1995, coll. Eiji Yamamoto; 4♀♀, Masagoya, Odamiyama, Uchiko-cho, 17, May 1993, coll. Eiji Yamamoto; 1♂1♀, Kitagawara, Masaki-chogoya, Odamiyama, Uchiko-cho, 22, July 1994, coll. Eiji Yamamoto; 1♂2♀♀18y, Nagusa-dani, Odamiyama, Uchiko-cho, 21, July 1994, coll. Eiji Yamamoto; 7♂♂21♀♀, Nagusa-dani, Odamiyama, Uchiko-cho, 18, Oct. 1994, coll. Eiji Yamamoto; 5♀♀, Nagusa-dani, Odamiyama, Uchiko-cho, 14, Oct. 1994, coll. Eiji Yamamoto; 1♀, Nagusa-dani, Odamiyama, Uchiko-cho, 6, July 1994, coll. Eiji Yamamoto; 1♀, Shihsigoe-touge, Odamiyama, Uchiko-cho, 22, July 1994, coll. Eiji Yamamoto; 1♂3♀♀, Odamiyama, Uchiko-cho, 27, Oct. 1995, coll. Eiji Yamamoto; 1♀, Odamiyama, Uchiko-cho, 1, Oct. 1995, coll. Eiji Yamamoto; 1ex, Foot of Mt. Ishizuchi, Saijo-shi (alt. 1600m), June 1981, coll. Kyoryu Kazui, (TOYA Cr-1083); 4exs. Tsutsuki, Mikawamura, 22, Mar. 1976, coll. Yoshiaki Nishikawa (TOYA Cr-1089~1092); 4exs. Kitauwa-gun, 11, Mar. 1978, coll. Yoshiaki Nishikawa (TOYA Cr-1093~1096); 2♂♂2♀♀, front of Rakan-ana, Nomura-machi, 5, Sep. 1982, coll. Yoshiaki Nishikawa; 1ex, Narayabu, Yanagiyamura, 21, Mar. 1976, coll. Yoshiaki Nishikawa; 4exs, Tobe-cho, 1981, Oct. 1981, coll. Kazuo Ishikawa (TOYA Cr-1528~1531), Madaejaana, Shinguu-mura, 23, Nov. 1977, coll. Kazuo Ishikawa (TOYA Cr 1525); 2♀♀, Nagosedani, Saijo-shi, 26, May 1981, (TOYA Cr-599~600); 1ex, Nanokawa-touge, Mogou-mura, May 1981, coll. Hisao Nambu (TOYA Cr-721); 4exs. Okunodaira, Tachikawayama, Niihama-shi, 3, Oct. 1981, coll. Shingo Tanaka (TOYA Cr-1165~1168); 6exs, Tatsuka-kaminaka-mura, Tamagawa-machi, 3, Oct. 1981, coll. Shingo Tanaka (TOYA Cr-1169~1174); 3exs, Nishinokawa, Kumamachi, 3, Oct. 1981, coll. Shingo Tanaka (TOYA Cr-1178~1180);



lex, Misaka-touge, 3, Oct. 1981, coll. Shingo Tanaka (TOYA Cr.1181).

*Remarks* : The specimens collected from the *Castanopsis cuspidata*-forest of Matsuyama-shi have straight endopod of pleopod 2, with 5-6 denticles near the tip but without any spurs.

***Ligidium (Ligidium) iyoense* Nunomura, 1983**

**(Japanese name:Iyo-chibihime-funamushi)**

*Ligidium iyoense* Nunomura, 1983a, p. 46, figs.15-16 (Narayabu, Yanadani-mura, Kamiukena-gun, from litter zone, 600m in altitude)

*Material examined*: 1♂1♀, Narayabu (alt.600m), Nanagidani-mura, 21, Mar. 1976, coll. Yoshiaki Nishikawa; 1♂1♀, Heikedani, Yawatahama-shi, 15, Apr. 1980, coll. Eiji Yamamoto.

Family Trichoniscidae

***Haplophthalmus danicus* Budde-Lund, 1879**

**(Japanese name:Naga-warajimushi)**

*Haplophthalmus danicus* Budde-Lund, 1879, p. 9.

*Material examined*: 1♀, *Castanopsis cuspidata*-forest, Shiroyama, Matsuyama-shi, 16. Mar. 2008, coll. Eiji. Yamamoto; 1♂, *Castanopsis cuspidata*-forest, Shiroyama, Matsuyama-shi, 20.Dec. 2008, coll. Eiji. Yamamoto; 12♀♀, Shitama, Yawatahama-shi, 12, Sep. 2012, coll. Toshiki Mohri; 1♀, *Celtis sinensis*-forest, Hijikawa, Higashiozu, Oozu-shi, 26, Mar. 2003, coll. Eiji Yamamoto.

Family Scyphacidae

***Armadilloniscus japonicus* Nunomura, 1984**

**(Japanese name:Nihon-hama-warajimushi)**

*Armadilloniscus japonicus* Nunomura, 1984a, p. 6, figs. 32-33 (Sakurajima-machi, Kagoshima Pref.)

*Material examined*: 1♂2♀♀, Sone, Doi-cho, Shikokuchuo-shi, 11, July 2012, coll. Kazuo Ishikawa and Haruko Ishikawa; 1♀, Hakata-cho-takeda, Imabari-shi, 16, Apr. 2012, coll. Toshiki Mohri.

Family Alloniscidae

***Alloniscus balssi* (Verhoeff, 1928)**

**(Japanese name:Nihon-tama-warajimushi)**

*Japanoniscus balssi* Verhoeff, 1928, 32, figs. 7-16.

*Alloniscus balssi*, Arcangely, 1965. Nunomura, 1999a, p. 87.

*Material examined*: 1♂, Shiraishinohana, Takahama-cho, Matsuyama-shi, 21, Sep. 2012, coll. Kazuo Ishikawa; 5♂♂20♀♀, Shiroishi-nohana, Takahama-cho, Matsuyama-shi, 23, Sep. 2012, coll. Kazuo Ishikawa; 2♂♂2♀♀, Sea-side Park, Futami-cho, Iyo-shi, 9, Apr. 2012, coll. Noboru Nunomura ; 1♀, Ohsuminohana, Namikawa-cho, Takahama-cho, Matsuyama-shi, 23, Sep. 2012, coll. Kazuo Ishikawa.

Family Halophilosciidae

***Littorophiloscia nipponensis* Nunomura, 1986**

**(Japanese name: Nippon-hirowarajimushi)**

*Littorophiloscia nipponensis* Nunomura, 1986 p. 10, fig. 61 (Akasaki, Uchiura-cho, Ishikawa Pref.).

*Material examined*: 1♂3♀♀, Sone, Doi-cho, Shikokuchuo-shi, 11, July 2012, coll. Kazuo Ishikawa and Haruko Ishikawa; 1♂16♀♀, Nakajima-machi, 7, Oct. 1991, coll. Noboru Nunomura.

Family Philosciidae

***Burmoniscus japonicus* (Nunomura, 1986)**

**(Japanese name: Yamato-mori-warajimushi)**

*Setaphora japonica* Nunomura, 1986, p. 22, figs. 68-69 (Fujishirozaka, Kainan, Wakayama Pref.).

*Burmoniscus japonicus* (Nunomura, 1986) 1999a, p. 87.

*Material examined*: 1 ♂ 7 ♀ ♀, Takata, Uwajima-shi, 3, June 2012, coll. Noboru Nunomura; 5 ♀ ♀, Arashi, Tsushima-cho, Uwajima-shi, 3, June 2012, coll. Noboru Nunomura; 6 ♂ ♂ 36 ♀ ♀, Sunokawa, Ainan-cho, 3, June 2012, coll. Noboru Nunomura; 2 ♀ ♀, Misho-midoro, Ainan-cho, 3, June 2012, coll. Noboru Nunomura; 2 ♀ ♀, Uchiogushi, Masuda, Ainan-cho, 3, June 2012, coll. Noboru Nunomura; 2 ♀ ♀, Komobuchi, Uwajima-shi, 8, Apr. 2012, coll. Noboru Nunomura; 3 ♂ ♂ 15 ♀ ♀, Shitaba, Uwajima-shi, 8, Apr. 2012, coll. Noboru Nunomura; 1 ♂ 5 ♀ ♀, Ooku, Ikata-cho, 9, Apr. 2012, coll. Noboru Nunomura; 3 ♀ ♀, Futami, Ikata-cho, 9, Apr. 2012, coll. Noboru Nunomura; 1 ♂, Suzaki-kannon, Nagahaya, Mikame-cho, Seiyo-shi, 8, Apr. 2012, coll. Noboru Nunomura; 1 ♂ 1 ♀, Shiroishinohana, Takahama-cho, Matsuyama-shi, 23, Sep. 2012, coll. Kazuo Ishikawa; 5 ♀ ♀, bamboo-forest, downstream of Shigenobu-gawa, Kitagawara, Masaki-cho, Iyo-shi, 9, Apr. 2004, coll. Eiji Yamamoto; 2 ♂ ♂ 4 ♀ ♀, Shitama, Yawatahama-shi, 12, Sep. 2012, coll. Toshiki Mohri; 1 ♀, Kutsunajima Hachimangu, Oura Is. Nakajima, Matsuyama-shi, 9, July 2009, coll. Nobuo Tsurusaki.

***Burmoniscus murotoensis* (Nunomura, 1986)**

**(Japanese name: Muroto-mori-warajimushi)**

*Setaphora murotoensis* Nunomura, 1986 p. 25, figs. 70-71 (Sakiyama, Muroto City, Kochi Pref.)

*Burmoniscus murotoensis* (Nunomura, 1986) 1999a, p. 87.

*Material examined*: 1 ♀, Yusu, Uwajima-shi, 8, Apr. 2012, coll. Noboru Nunomura; 1 ♂ 4 ♀ ♀, a forest of Shiia, Yura-cho, Minamiuwa, 19, July 1980, coll. Kazuo Ishikawa; 1 ♀, Asahigaoka, Matsuyama-shi, 2008, coll. Eiji Yamamoto; 7 ♀ ♀, Shiroyama, Asahi-machi, Matsuyama-shi, 16, Mar. 2008, coll. Eiji Yamamoto; 3 ♂ ♂ 6 ♀ ♀, Asahi-machi, 16, July 2008, Matsuyama-shi, coll. Eiji Yamamoto; 1 ♂ 3 ♀ ♀, Hijikawa, Higashiouzu, Oozu-shi, 12, May 1993, coll. Eiji Yamamoto; 9 ♀ ♀, Tada, Oozu-shi, 14, Mar. 2009, coll. Eiji Yamamoto; 6 ♂ ♂ 2 ♀ ♀, Gotanda, Kawamai, Yawatahama-shi, 5, Oct. 1981, coll. Shingo Tanaka (TOYA Cr- 5576~5584).

Family Agnaridae

***Lucasioides yamamotoi* n.sp.**

**(Japanese name: Yamamoto-hayashi-warajimushi)**

**(Figs. 2-3)**

*Material examined*: 2 ♂ ♂ (1 ♂, holotype, 9.5 mm in body length and 1 ♂, paratype, 7.2 mm in body length) and 24 ♀ ♀ (1 ♀ allotype, 8.9 mm in body length and 23 ♀ ♀, paratypes, 6.8-7.5 mm in body length), *Castanopsis cuspidata*-forest, Shiroyama, Marunouchi, Matsuyama-shi, 20, Dec. 2008, coll. Eiji Yamamoto; 1 ♂ 1 ♀, Hijikawa, Higashi, Oozu, Oozu-shi, *Celtis sinensis* var. *japonica*-*Pleiblastus Simonii* forest, coll. Eiji Yamamoto. Type series is deposited as follows: holotype (TOYA Cr- 23462), allotype (TOYA Cr- 23463), and 6 paratypes (TOYA Cr-23464~23468, 23511) at Toyama Science Museum, Toyama, 4 paratypes (OMNH Ar-9520~9525) at Osaka Museum of Natural History, 4 paratypes, Ehime University Museum and 6 paratypes (6 ♀ ♀, KMNH IvR 500,658~500,663) at Kitakyushu Museum of Natural History and Human History, Kitakyushu.

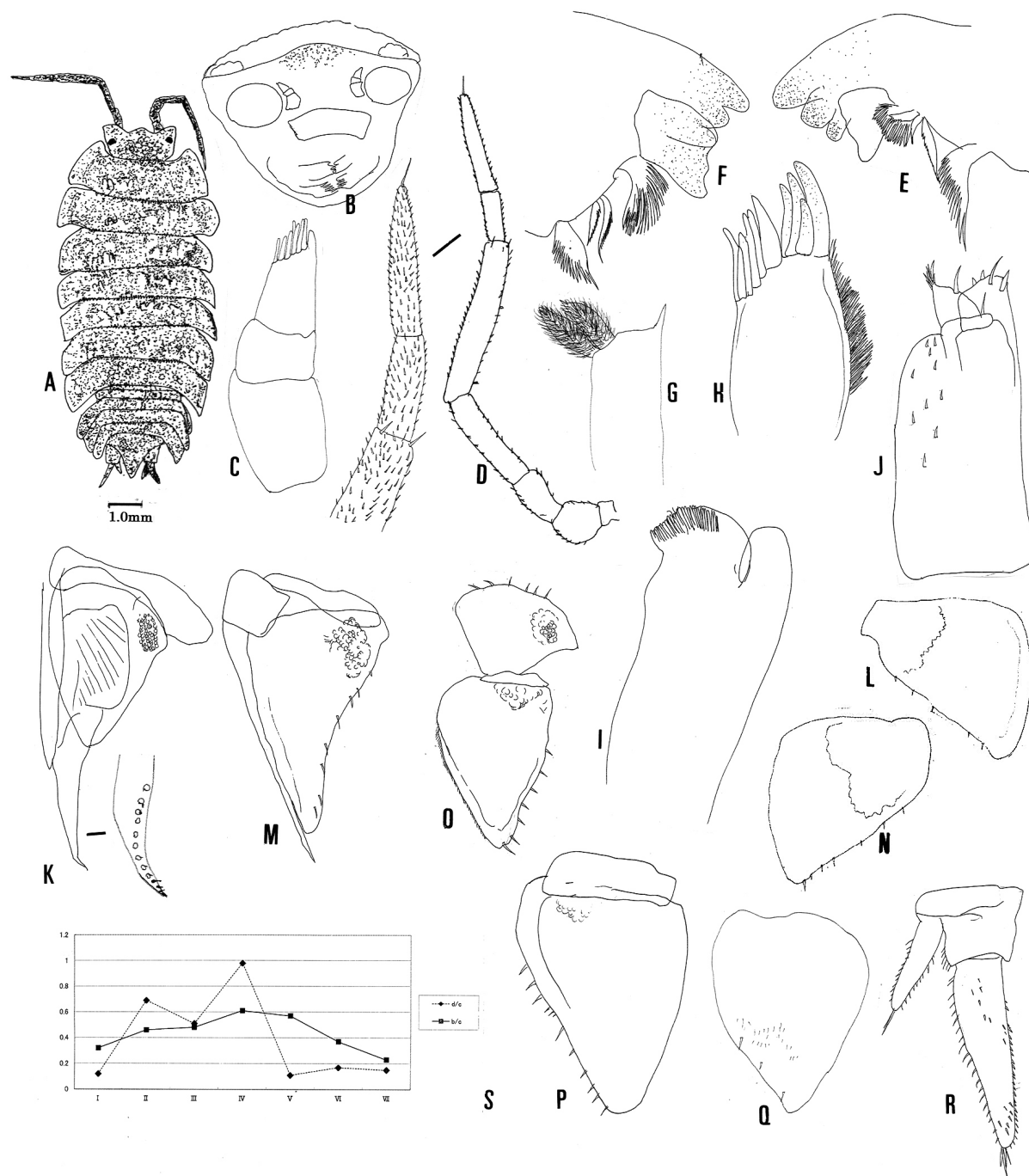
Non-type: 1 ♀, Kobayashi, Doi-cho, Shikokuchuo-shi, 17, July 2012, coll. Kazuo Ishikawa.

*Description*: Body (Fig. 2A) elliptical, 2.3 times as long as wide. Cephalon with medial process; antero-lateral process; linea frontalis with obtuse-angle triangular; linea supra-antennalis straight. Pereonal somites parallel. Eyes mediocre in size, each eye with about 20 ommatidia. Noduli lateralis on pereonal somites 2-4 situated far from the lateral border (Fig. 2S). Pleotelson triangular and both side slightly concave.

Antennule (Fig. 2C) three-segmented, terminal segment with 8 aesthetascs at the tip. Antenna (Fig. 2D),

reaching the posterior part of first pereonal somite, with 5 peduncular segments and 2 flagellar segments. Second flagellar segment 1.5 times as long as the first.

Right mandible (Fig. 2E): par incisiva 3-toothed; lacinia mobilis weakly 3-lobed, 3 penicils, processus molaris represented by a tuft of setae. Left mandible (Fig. 2F): pars incisiva 3-toothed; lacinia mobilis 3-lobed, 2 penicils, processus molaris represented by a tuft of setae. Maxillula: mesial endite (Fig. 2G) with an acute projection and 2 stout plumose setae; lateral endite (Fig. 2H) with 10 simple teeth. Maxilla (Fig. 2I): medial lobe with a cusp



**Fig. 2** *Lucasioides yamamotoi* n.sp.

A, Body (dorsal view); B, Cephalon (frontal view); C, Antennule; D, Antenna; E, Right mandible; F, Left mandible; G, Mesial endite of maxillula; H, Lateral endite of the same; I, Maxilla; J, Maxilliped; K, Penes and male pleopod 1; L, Female pleopod 2; M, Male pleopod 2; N, Female pleopod 2; O, Pleopod 3; P, Pleopod 4; Q, Pleopod 5; R, Uropod; S, Position of noduli lateralis (All: holotype male).

apically; lateral lobe relatively narrow. Maxilliped (Fig 2J): endite rectangular, with 3 setae and a seta on distal end; palp relatively short, with a seta on inner margin and a bundle of setae at the tip.

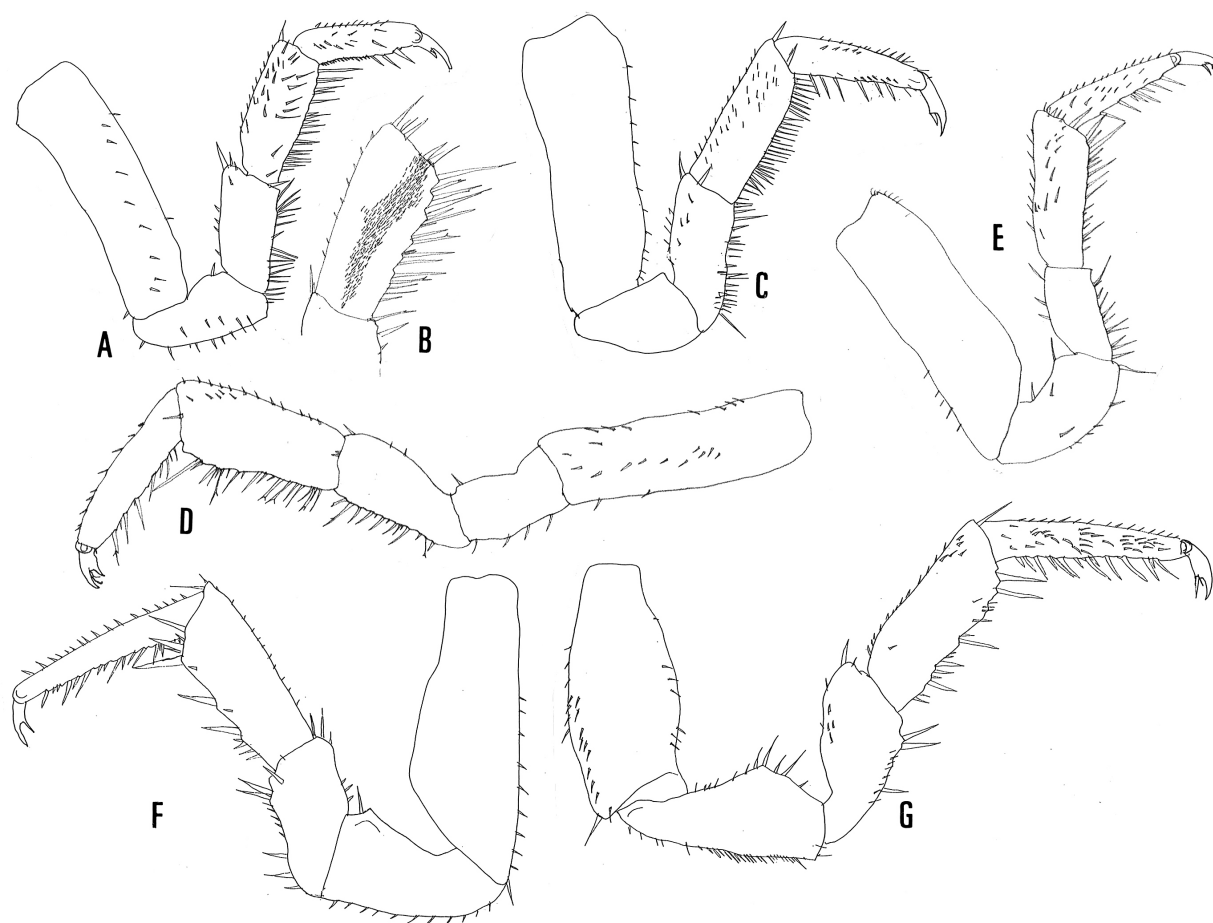
Pereopod 1(Fig.3 A and B): basis 3.5 times as long as wide; ischium half-length of basis; merus 0.8 times as long as ischium, with more than 15 long setae on inner margin; carpus 1.3 times as long as merus, with a brush for cleaning the antenna on frontal surface and 19-20 setae on inner margin; propodus 0.9 times as long as carpus, with many short setae on basal half of inner margin and 3 setae on distal half of outer margin; dactylus with a dactylar seta.

Pereopod 2(Fig. 3C): basis 3.0 times as long as wide; ischium shorter than half length of basis; merus a little longer than ischium, with 20-23 setae on inner margin; carpus a little longer than carpus, with about 30 setae long setae on inner margin; propodus as long as carpus, with 6-8 setae on inner margin; dactylus with a dactylar seta.

Pereopod 3(Fig. 3D): basis 3.0 times as long as basis; ischium 0.45 times as long as basis; merus 1.2 times longer than merus, with 15-16 setae on inner margin; carpus 1.2 times longer than merus, with 15-16 setae on inner margin; propodus little shorter than carpus, with 15-16 setae on inner margin; dactylus with a dactylar seta.

Pereopod 4 (Fig. 3E): basis 3.2 times as long as wide; ischium 55% as long as basis; merus 0.65 times as long as basis, with 12-13 relatively long setae on inner margin; carpus 1.5 times longer than merus, with 17-18 setae on inner margin; propodus as long as carpus, with 8 setae on inner margin; dactylus with a dactylar seta.

Pereopod 5 similar to pereopod 4.



**Fig. 3** *Lucasioides yamamotoi* n.sp.

A, Pereopod 1; B, Lateral view of carpus of the same; C, Pereopod 2; D, Pereopod 3; E, Pereopod 4; F, Pereopod 6; G, Pereopod 7(All: holotype male).

Pereopod 6 (Fig. 3F): basis 3.0 times as long as wide; ischium 55% as long as basis; merus three-fourths as long as basis, with 5-6 relatively long setae and 5-6 short setae on inner margin; carpus 1.35 times longer than merus, with 5-6 longer setae and several short setae on inner margin; propodus a little longer than carpus, with 15-16 setae on inner margin.

Pereopod 7 (Fig. 3G): basis 2.3 times as long as wide; ischium a little shorter than basis, with much setae on inner margin and 11-12 setae on outer margin; merus three-fourths as long as ischium, with 3 long setae on inner margin; carpus 1.3 times longer than merus, with 5 longer setae and 12 shorter setae on inner margin; propodus a little longer than carpus, with 15-16 setae on inner margin; dactylus with a dactylar seta.

Penes (Fig. 2K) narrow and fusiform, 10 times longer than wide.

Pleopod 1 (Fig. 2K): endopod tapering toward the tip, apical part bents outer-ward with more than 13 denticles; exopod rounded triangular, with a very shallow concavity on outer margin.

Pleopod 2 (Fig. 2M): endopod tapering towards the tip; exopod rounded triangular with 8 setae on outer margin.

Pleopod 3 (Fig. 2O): endopod almost square, distal end protruded roundly, exopod elongated triangular, with 7-8 setae on outer margin.

Pleopod 4 (Fig. 2P): endopod fan-shaped, with 11-12 setae on outer margin, exopod triangular, with 7 setae on outer margin.

Pleopod 5 (Fig. 2Q): endopod is small and rectangular, exopod triangular, with 3 setae around the margin and pectinated scales sparsely.

Uropod (Fig. 2R): peduncle almost square, endopod elongated and ellipsoidal, with several setae; exopod 1.9 times longer than, with several setae at the tip, 20 setae on inner margin and 30 setae on outer margin.

Female similar to male except sexual characters.

Etymology: The Species name is dedicated to Mr. Eiji Yamamoto, of Yamamoto Institute of Forest Biology, Oda-machi, Ehime Prefecture.

*Remarks:* The present new species is most closely allied to *Lucasioides nishimurai* (Nunomura, 1987) reported from central and western Japan, but the former is separated from the latter in the following features: (1) lacking a distinct small concavity on exopod of male first pleopod, (2) more setae on seventh pereopod, (3) absence of bifurcated setae on inner margin of pereopod 1, (4) numerous aesthetascs on antennule, (5) shorter flagellar segment of antenna, and (6) numerous setae on carpus of pereopods 6-7.

The present new species is also allied to *Lucasioides sinuosus* (Nunomura, 1987) recorded from Shikoku Island, but differs from the latter in the following features: (1) absence of concavity on the distal part of exopod of male pleopod, (2) relatively longer of first flagellar segment of antenna, (3) absence of concavity at the tip of male first pleopod, (4) longer endopod of male second pleopod, (5) numerous aesthetascs on antennule, (6) presence of an acute projection of maxillula, (7) longer flagellar segment of antenna and (8) sparser setae on inner margin of pereopod 1.

***Lucasioides sinuosus* (Nunomura, 1987)**  
(Japanese name: Namiberi-warajimushi)

*Nagurus sinuosus* Nunomura, 1987, p. 10, fig. 104 (Mitsutsuji-yama, Tosa-cho, Kochi Pref.).

*Lucasioides sinuosus* (Nunomura, 1987) Nunomura, 1999a, p. 87.

*Material examined:* 2♂♂1♀, Namakusa-rindou, Odamiyama, 25, Oct. 1994, coll. Eiji Yamamoto; 1♀, Odamiyama, 1, May 1994, coll. Eiji Yamamoto; 1♂3♀♀, Masagoya, Odamiyama, 22, June 1994, coll. Eiji Yamamoto; 1♂, Ukena, Odamiyama, 4, May 1994, coll. Eiji Yamamoto; 1♂1♀, Odamiyama, 6, Oct. 1997, coll. Eiji Yamamoto; 2♂♂, Mt. Tsuchigoya, 2, Nov. 1972, coll. Kazuo Ishikawa; 7♀♀, *Fagus*-forest, Odamiyama (alt.800m), in altitude, 6, Oct. 1992, coll. Eiji Yamamoto; 2♀♀, Hijikawa, Oozu-shi, 26, Mar. 2003, coll. Eiji Yamamoto; 1♂2♀♀, Nametoko Valley (alt. 500m), Uwajima-shi, 13, Nov. 1998, coll. Shuhei Nomura.



***Lucasioides nishimurai* (Nunomura, 1987)**

**(Japanese name: Satoyama-hayashi-warajimushi, new)**

*Nagurus nishimurai* Nunomura, 1987, p. 17, fig. 107 (Seto; Shirahama, Wakayama Pref.).

*Lucasioides nishimurai*, Nunomura, 1999a, p. 87.

**Material examined:** 2♂♂ (up to 8.5 mm in body length) and 32 ♀♀ (9.4-14.0 mm in body length), Mishomidoro, Ainan-cho, 3, June 2012, coll. Noboru Nunomura; 2♂♂5♀♀, bamboo forest, downstream of Shigenobu-gawa, Kitagawara, Masaki-cho, Iyo-shi, Apr. 2004, coll. Eiji Yamamoto; 3♀♀, Asahigaoka, Matsuyama-shi, 10, May 2008, coll. Eiji Yamamoto; 1♀, Asahigaoka, Matsuyama-shi, 13, May 2009, coll. Eiji Yamamoto; 1♂2♀♀, Nakagawara, Matsuyama-shi, downstream area of Shigenobugawa, 9, Apr. 2004, coll. Eiji Yamamoto; 4♂♂12♀♀, Michou-jinja, Uchiko-cho, 13, Aug. 1995, coll. Eiji Yamamoto; 2♂♂6♀♀, Shiraishino-hana, Katsuoka-cho, Matsuyama-shi, 9, Apr. 2012, coll. Noboru Nunomura; 1♀, Hanta-ji, Hatadera-machi, Matsuyama-shi, 6, Apr. 2012, coll. Noboru Nunomura; 2♂♂1♀, Hakatacho-takeda, Imabari-shi, 16, Apr. 2012, coll. Toshiki Mohri; 1♀, Matsuo, Kikuma, Imabari-shi, 29, Apr. 2012, coll. Kazuo Ishikawa; 2♂♂4♀♀, Rakando, Cave, 11, Oct. 1990, coll. Shuhei Nomura; 2♂♂4♀♀, Kirou-zan, Yoshiumi-cho, 23, Feb. 2013, coll. Toshiki Mohri; 3♀♀, Isono-jinja, Kano-ko, Saijo-shi, 6, Apr. 2012, coll. Haruko Ishikawa; 1♂1♀, Kutsuna-jima, Hachimangu, Oura, Is. Nakajima, Matsuyama-shi, 9, July 2009, coll. Nobuo Tsurusaki; 1♀, Shiroyama, Matsuyama-shi, 7, Oct. 2012, coll. Kazuo Ishikawa; 3♂♂4♀♀, Asou, Tobe-machi, 20, Oct. 2012, coll. Kazuo Ishikawa.

***Lucasioides albulus* n.sp.**

**(Japanese name: Usuiro-hayashi-warajimushi, new)**

**(Figs. 4-5)**

**Material examined:** 3♂♂ (1♂ holotype, 5.7 mm in body length and 2♂♂ paratypes, 5.7-5.9 mm in body length) and 4♀♀ (1♀ allotype, 5.5 mm in body length and 3♀♀ paratypes, 3.3-4.0 mm in body length), Takahama, Matsuyama-shi, 8, Oct. 1991, coll. Noboru Nunomura.

Type series is deposited as follows: holotype (TOYA Cr-23451), allotype (TOYA Cr-23452) and a paratype (TOYA Cr-23453) at Toyama Science Museum; 2 paratypes (1♂, KMNH IvR 500,656 and 1♀, KMNH IvR 500,657) at Kitakyushu Museum of Natural History and Human History and 2 paratypes at Ehime University Museum.

Non-type: 1ex, Kashima, Hojo-shi, 6, Oct. 1991, coll. Noboru Nunomura.

**Description:** Body (Fig. 4A) ellipsoid, 2.5 times as long as wide. Color white in alcohol. Cephalon (Fig. 4B): linea frontalis straight; linea supra-antennalis recurved. Anterior margin of cephalon low and rounded medial process and anterolateral projections. Eyes mediocre in size, each eye with 13 ommatidia. Posterior margin of pleotelson. Noduli lateralis on pereonal somites 2-4 far from the lateral border (Fig. 4R).

Antennule (Fig. 4C) three-segmented; basal article stout; second segment; terminal somite with 6 aesthetascs at the tip. Antenna (Fig. 4D), reaching the middle part of second pereonal somite, with second flagellar segment 2.5 times as long as the first.

Right mandible (Fig. 4E): pars incisiva 3 teeth, lacinia mobilis single-toothed; 3 penicils; processus molaris is represented by a tuft of single setae. Left mandible (Fig. 4F): pars incisiva, 3-teeth; lacinia mobilis with 3-toothed; 2 plumose setae; 2 penicils; processus molaris represented by a tuft of single setae. Maxillula (Fig. 4G and H): lateral endite on its apical margin with and outer group 4 robust, simple teeth, three of them cleft. Maxilla (Fig. 4I): medial lobe wide; lateral lobe narrow. Maxilliped (Fig. 4J): endite apically with 3 cusps and a strong seta; palp three-segmented; segment 2 with tuft of a few setae apically, proximal segment with a seta.

Pereopod 1 (Fig. 5A): basis 3.1 times as long as wide; ischium half-length of basis; merus almost as long as ischium, with many setae on inner margin; carpus as long as merus, with a brush for cleaning the antenna on frontal surface and many setae including 3 longer and a few of trifurcated ones on inner margin; propodus with 13-14 shorter setae on basal half and 4 longer setae on distal half of inner margin; dactylus with a dactylar seta, with a dactylar seta.

Pereopod 2 (Fig. 5B): basis with 7-8 setae on inner margin; ischium half-length of basis, with 16-17 setae on inner margin; merus three-fourths length of ischium, with 11-12 setae on inner margin; carpus a little longest than merus, with 18-20 setae on inner margin; propodus 1.3 times longer than carpus, with 7 setae on outer margin; dactylus with a dactylar seta, with a dactylar seta. Pereopod 3 similar to pereopod 2.

Pereopods 4 and 5 similar. Pereopod 5 (Fig. 5C): basis with a strong seta at inner distal angle; ischium half-length of basis; merus three-fourths as long as ischium; carpus with 13-14 setae on inner margin including a trifurcated one; propodus with 5-6 setae including a long one on inner margin and 22-23 short setae on outer distal area.

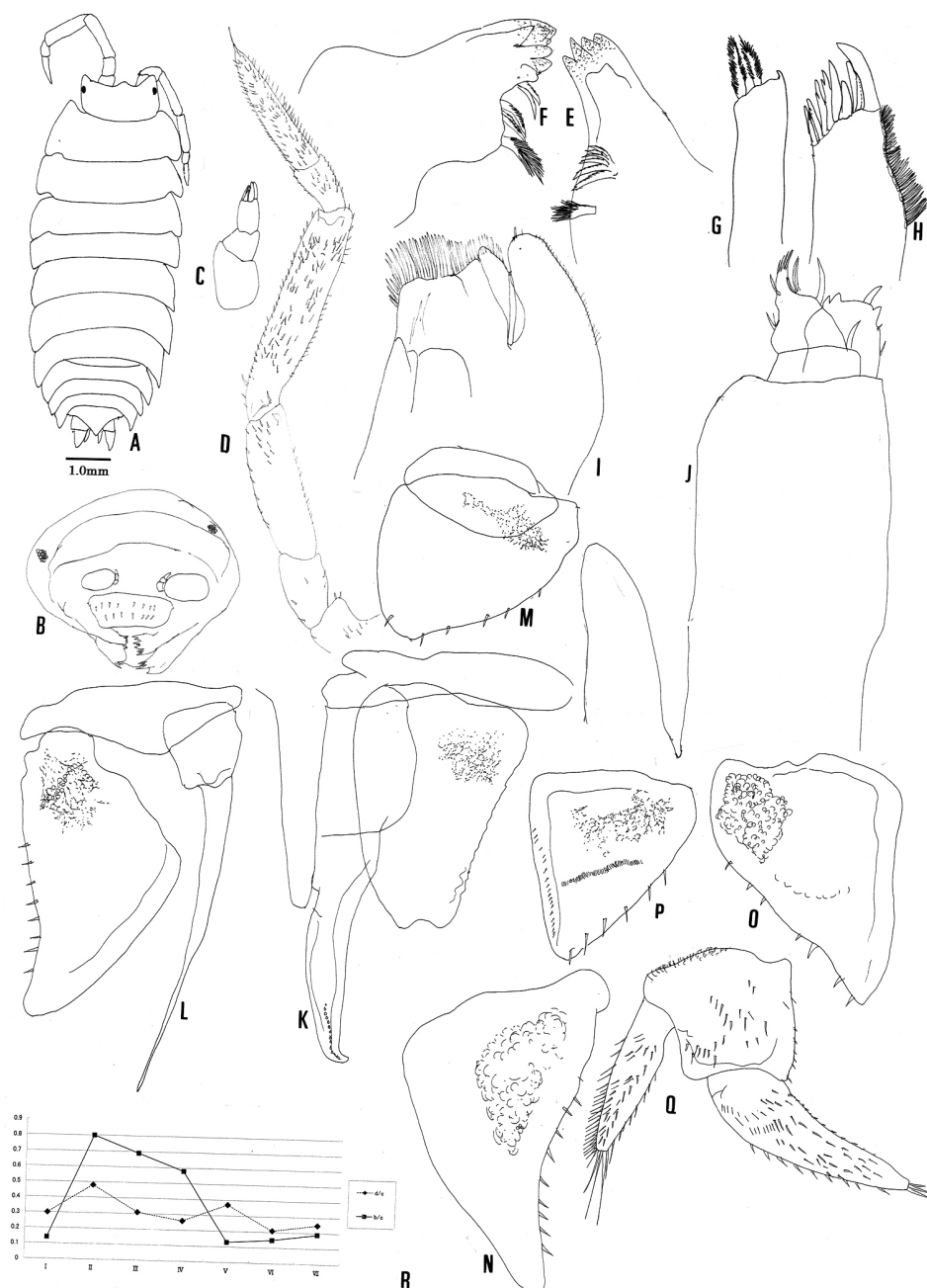


Fig. 4 *Lucasioides albulus* n.sp.

A, Body (dorsal view); B, Cephalon frontal view; C, Antennule; D, Antenna; E, Right mandible; F, Left mandible; G, Mesial endite of maxillula; H, Lateral endite of the same; I, Maxilla; J, Maxilliped; K, Penes and male pleopod 1; L, Male pleopod 2; M, Female pleopod 2; N, Pleopod 4; O, Pleopod 5; P, Uropod; R, Position of Noduli lateralis (A-L, N-R: holotype male, M: allotype female).



Pereopod 6 (Fig. 5D): basis with a stronger tooth at inner distal angle and many weaker setae on inner and outer areas; ischium 55% as long as basis, with 2 setae on a sternal margin and 14-15 setae on inner margin; merus 0.6 times as long as ischium, with a longer bifurcated setae at inner dorsal area; carpus 1.2 times longer than merus, with 7-8 bifurcated setae on inner margin; propodus a little longer than carpus; dactylus with a dactylar seta with a dactylar seta.

Pereopod 7 (Fig. 5E): basis rectangular, with a longer seta on inner distal area; ischium, 0.7 times as long as basis, inflated on outer margin, with 5 relatively longer setae including 2 trifurcated ones and 13-14 short setae on outer distal area; merus 0.6 times as long as ischium, with more than 20 setae on inner margin and 2 longer and a few setae on outer margin; carpus 1.5 times longer than merus, with 5 setae on inner margin; propodus a little longer than carpus, with 15-16 setae on inner margin; dactylus with a dactylar seta with a dactylar seta.



**Fig. 5** *Lucasioides albulus* n.sp

A, Pereopod 1; B, Pereopod 2; C, Pereopod 5; D, Pereopod 6; E, Pereopod 7 in male; F, Pereopod 7 in female (A-E: holotype male, F: paratype female).

Penes (Fig. 4K): slender, only slightly tapering toward the tip; tip rounded.

Pleopod 1 (Fig. 4K): endopod almost straight but slightly tapering toward the tip, apical part bent outward, bearing a series of more than 15 denticles; exopod rectangular, but tapering toward the tip, distal margin with shallow concavity, outer margin slightly sinuate.

Pleopod 2 (Fig. 4L): endopod tapering toward the tip; exopod rounded triangular, with 8 setae on outer margin.

Pleopod 3 (Fig. 4N): endopod slightly wrinkled; exopod triangular, with 7-10 setae on outer margin.

Pleopod 4 (Fig. 4O): exopod triangular, with 7-10 setae on outer margin.

Pleopod 5 (Fig. 4P): exopod triangular, with 6 setae on outer margin and a series of transverse pectinated scales.

Uropod (Fig. 4Q): peduncle square; exopod two-thirds as long as endopod.

Female similar to male except sexual characters and not inflated and less setose outer margin of ischium of pereopod 7 (Fig. 5F). Pleopod 2 (Fig. 4M) of female: endopod slightly wrinkled; exopod roundly triangular, with 6-9 setae on outer margin.

Etymology: The species name “*albulus*” means “whitish” in Latin.

*Remarks:* The present new species is most closely allied to recorded from *Lucasioides toyamaensis* (Nunomura, 2008), reported from the nest material of a Japanese mole, *Mogera imaizumii*, Nanto-shi, Toyama, especially in having pale-colored body and inflated outer margin of carpus of male seventh pereopod, but the former is separated from the latter in the following features: (1) not sinuated distal margin of exopod of male pleopod 1, (2) having bow-like linea frontalis of cephalon, (3) not so inflated outer margin of carpus of male seventh pereopod, (4) shorter pleotelson, (5) less numerous setae on inner margin of merus and carpus of fifth and sixth pereopods and (6) less numerous of setae of second pereopod.

### ***Lucasioides punctatus* n.sp.**

**(Japanese name: Hanten-hayashi-warajimushi)**

**(Figs. 6-7)**

*Material examined:* 2♂♂ (1♂ holotype, 6.6 mm in body length and 1♂ paratype, 6.5 mm in body length) and 10♀♀ (1♀ allotype, 7.8 mm in body length and 9♀♀, paratypes. 5.2-7.6mm in body length), Setogi, Nakajima, Matsuyama-shi, 7, Oct. 1991, coll. Noboru Nunomura.

Type series is deposited as follows: holotype (TOYA Cr-23392), allotype (TOYA Cr-23393) and 3 paratype (TOYA Cr 23394~23396) at Toyama Science Museum, 2 paratypes at Ehime University Museum, 2 paratypes (OMNH Ar 9518~9519) at Osaka Museum of Natural History, 3 paratypes (1♂, KMNH IvR 500,653 and 2♀♀, KMNH IvR 500,654~500,655) at Kitakyushu Museum of Natural History and Human History.

Non-type: 6♂♂ (6.2-10.5mm in body length) and 11♀♀ (4.9-7.8mm in body length), 7, Oct. 1991, coll. Noboru Nunomura; 6♀♀ (9.1-10.8mm), Kashima. Hojo-shi, 6, Oct. 1991, coll. Noboru Nunomura; 1♀ (8.4 mm in body length), Komata, Niihama-shi, 1, June 1981, coll. Kazuo Ishikawa (TOYA Cr-23520); 9♀♀, Shitama, Yawatahama-shi, 12, Sep. 2012, coll. Toshiki Mohri; 1♀, Yokoshima, Nakajima, Matsuyama-shi, 22, Feb. 2013. coll. Keizou Akiyama; 1♀, Is. Kashima (alt. 30m), Hojo, Matsuyama-shi, 10, July 2009, coll. Nobuo Tsurusaki; 1♀, Kobayashi, Doi-machi, Shikoku-chuo-shi, 7, July 2012, coll. Kazuo Ishikawa.

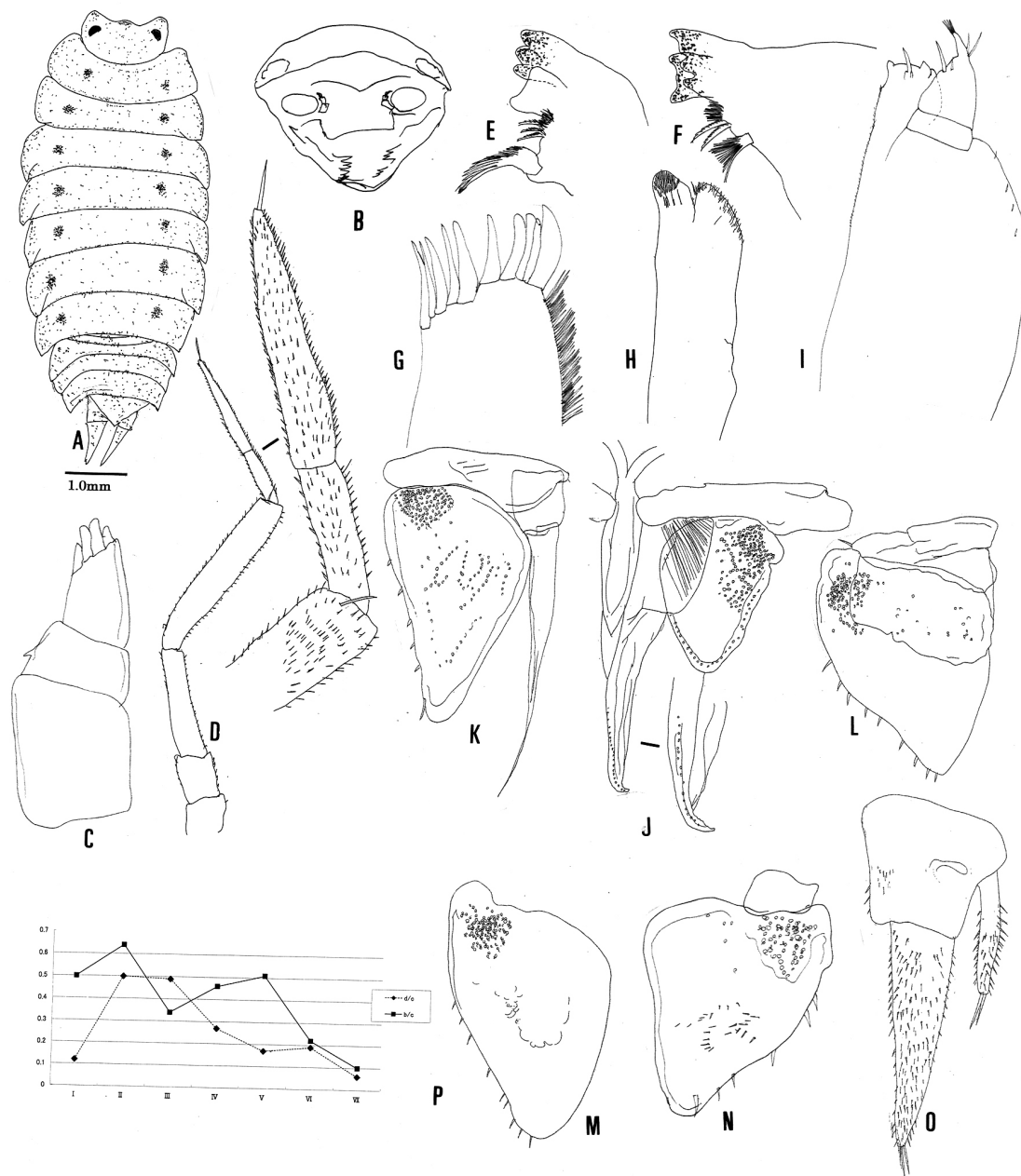
*Description:* Body (Fig. 6A) ellipsoid, 2.2 times as long as wide. Color pale yellow, with a pair of small, round darker areas on dorsal surface of pereonal somites. Tergite covered with many small granules. Cephalon (Fig. 6B): linea frontalis obtuse triangular; linea supra-antennalis present and folded in the middle part. Anterior margin of cephalon with a rounded lateral angles and a low medial projection. Noduli lateralis on pereonal somites 2-3 (Fig. 6P) far and 4 slightly far from the lateral border. Posterior margin of pleotelson right-angled triangular.

Antennule (Fig. 6C) three-segmented; terminal segment with 4 relatively short aesthetascs at the tip. Antenna (Fig. 6D): second flagellar segment 1.8 times as long as the first.

Right mandible (Fig. 6E): pars incisiva with 3 teeth, lacinia mobilis 2-toothed; 3 penicils; processus molaris

represented by a tuft of setae. Left mandible (Fig. 6F) pars incisiva with 3 teeth, lacinia mobilis 2-toothed; 2 penicils; processus molaris represented by a tuft of setae. Maxillula (Fig. 6G): with 10 simple teeth on lateral endite on its apical margin with laterodistal corner on mesial endite. Maxilla (Fig. 6H): apically bilobed, with sensilla on inner lobe and outer lobe. Maxilliped (Fig. 6I): endite apically with 3 cusps and a strong seta; palp three-segmented; segment 2 with proximal segment bearing a tuft of setae.

Pereopod 1 (Fig. 7A): basis 3.7 times as long as wide, with 10-11 setae on inner margin; ischium 0.4 times as long as basis, with 8-9 setae on inner margin and 2 setae on sternal margin; merus 1.1 times as long as ischium, with 10-11 setae on inner margin including 3 bifurcated ones, and 3 relatively strong teeth on outer distal

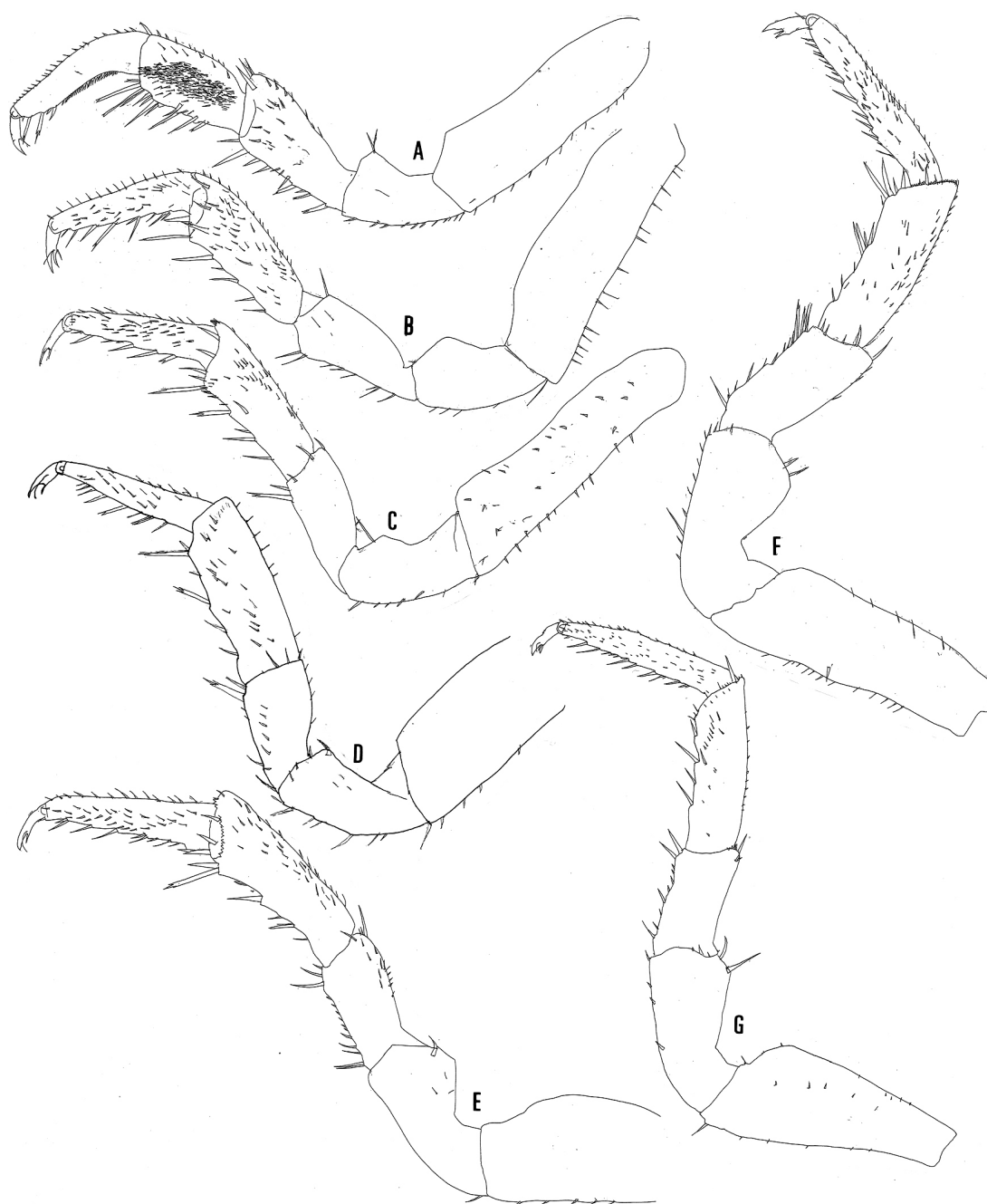


**Fig. 6** *Lucasioides punctatus* n.sp.

A, Body (dorsal view); B, Cephalon (frontal view); C, Antennule; D, Antenna; E, Right mandible; F, Left mandible; G, Lateral endite of maxillula; H, Maxilla; I, Maxilliped; J, Penes and male pleopod 1; K, Pleopod 2 in male; L, Pleopod 3; M, Pleopod 4; N, Pleopod 5; O, Uropod; P, Position of noduli lateralis (All: holotype male),

area; carpus a little shorter than merus, with a brush for cleaning the antenna on frontal surface and 12-14 setae on inner margin including 4 longer and bifurcated ones; propodus with about 20 shorter setae on basal half and 4 longer and trifurcated setae on distal half of inner margin; dactylus 1.3 times longer than carpus, with a dactylar seta.

Pereopod 2(Fig. 7 B): basis 3.5 times as long as wide, with 14-15 setae on inner margin; ischium 0.4 times as long as basis, with 8 setae on inner margin and a seta on sternal margin; merus a little longer than ischium, with 5-6 setae on inner margin; carpus 1.2 times longer than merus, with 5-6 setae on inner margin including 4 longer and bifurcated ones and 12-14 short setae on outer margin; propodus a little shorter than carpus, with about 10 setae including a trifurcated one on distal half of inner margin and 12-13 short setae on outer margin; dactylus with a dactylar seta.



**Fig. 7** *Lucasioides punctatus* n.sp.  
A-G. Pereopods 1-7(All: holotype male).

Pereopod 3 (Fig. 7C): basis 3.5 times as long as wide, with 12-13 setae on inner margin; ischium 0.4 times as long as basis, with 7 setae on inner margin; merus three-fourths as long as ischium, with 5-6 setae including a longer and trifurcated one, a seta on distal margin; carpus 1.4 times longer than merus, with 5-6 setae on inner margin including 2 longer and bifurcated ones and 7-8 short setae on outer margin; propodus as long as carpus, with about 6-8 setae including a trifurcated setae and 10 short setae on outer margin; dactylus with a dactylar seta.

Pereopod 4 (Fig. 7D): basis with 7-8 setae on inner margin; ischium with 6-7 setae on inner margin, a setae on sternal margin; merus with 4 setae on inner margin; carpus 1.4 times longer than merus, with 8-10 setae on inner margin including 3 longer ones and 13-14 short setae on outer margin; propodus a little shorter than carpus, with about 10 setae including a trifurcated setae and 10-12 short setae on outer margin; dactylus with a dactylar seta.

Pereopod 5 (Fig. 7E): basis with 11-12 setae on inner margin; ischium with 9 setae on inner margin, a seta on sternal margin; merus two-thirds as long as ischium, with 8 stronger and 5-6 weaker setae on inner margin; carpus 1.6 times longer than merus, with 6-8 setae on inner margin including a longer and bifurcated and 12-13 short setae on outer margin; propodus a little shorter than carpus, with about 12 setae and 12-13 short setae on outer margin; dactylus with a dactylar seta.

Pereopod 6 (Fig. 7F): basis 3.4 times longer than wide, with 11-12 setae on inner margin; ischium with 12-13 setae one on inner margin, 2 setae on sternal margin; merus with 10-13 setae on inner margin including a longer and bifurcated one; carpus with 10-11 setae on inner margin and 12 short setae on outer margin; propodus with about 17 setae and 13-14 short setae on outer margin; dactylus with a dactylar seta.

Pereopod 7 (Fig. 7G): basis with 12-13 setae on inner margin; ischium two-thirds as long as basis, with 6 setae on inner margin, 2 setae on sternal margin; merus two-thirds as long as ischium, with 7 setae on inner margin including a longer and trifurcated one; carpus 1.5 times longer than merus, with 6 setae on inner margin including a longer and bifurcated and 12-13 short setae on outer margin; propodus a little longer than carpus, with about 7-8 relatively long setae and 20 short setae on outer margin; dactylus with a dactylar seta.

Penes (Fig. 6J) fusiform, 5 times as long as wide.

Pleopod 1 (Fig. 6J): peduncle rectangular; endopod straight, with distal part bent outer wards, bearing a row of 20 denticles; exopod rounded triangular, with a small concavity at basal area of outer margin.

Pleopod 2 (Fig. 6K): endopod straight and tapering toward the tip; exopod rounded triangular, with 6 setae on outer margin.

Pleopod 3 (Fig. 6L): endopod rectangular; exopod rounded triangular, with 9 setae on outer margin.

Pleopod 4 (Fig. 6M): exopod rounded triangular, with 9 setae on outer margin.

Pleopod 5 (Fig. 6N): exopod with pectinated scales scattered in the middle area of caudal surface.

Uropod (Fig. 6O): peduncle square, almost as long as wide; endopod with many setae on surface and 3 setae at the tip; exopod slender, 1.9 times as long as wide, with 2 setae at the tip.

Female: similar to male except sexual characters

Etymology: "*puntatus*" means "spotted" in Latin. This species has a pair of darker patterns on each side.

*Remarks:* The present new species is most closely allied to *Lucasioides nishimurai* (Nunomura, 1987) in having a small concavity on basal area of outer margin, but the former is separated from the latter in the following features: (1) having spotted mark on dorsal surface of pereonal somites, (2) smaller concavity of exopod of male first pleopod, (3) less numerous setae on carpus and merus of pereopod 1, (4) numerous denticles on endopod of male first pleopod, (5) wider exopod of male second pleopod, (6) numerous aesthetascs of antennule and (7) absence of concavity of lateral margin of pleotelson.



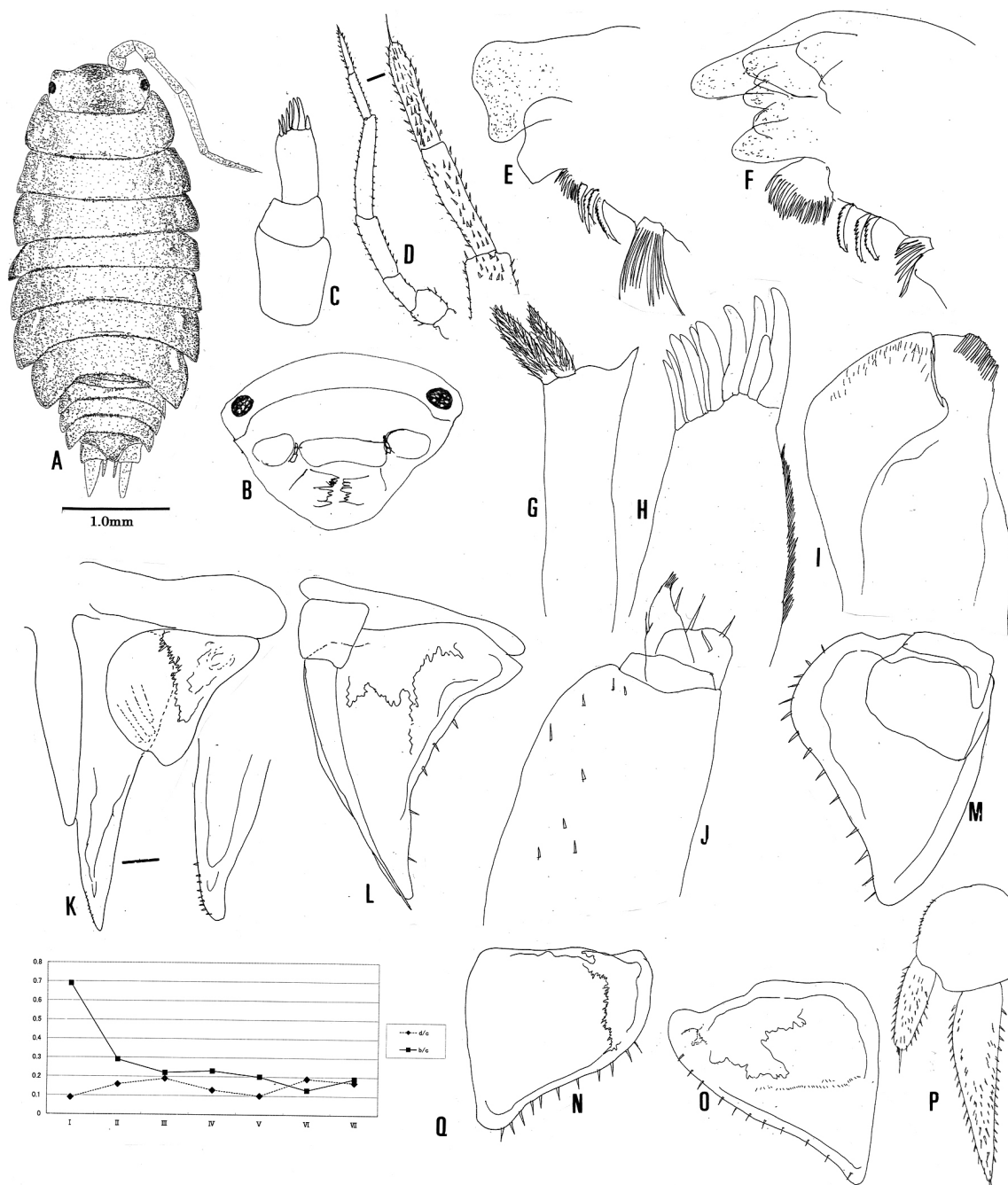
***Mongoloniscus ishikawai* n.sp.**

(Japanese name: **Ishikawa-sato-warajimushi, new**)

(Figs. 8-9)

*Material examined*: 1♂(holotype, 3.9 mm in body length) and 2♀♀(1♀ allotype, 4.2 mm in body length and 1♀ paratype, 3.8 mm in body length), Kuroiwa, Baishinji-machi, Matsuyama-shi, 25, Sep. 2012, coll. Kazuo Ishikawa.

Type series is deposited as follows: holotype (TOYA Cr-23454) and allotype (TOYA Cr-23455) at Toyama Science Museum and a paratype at Ehime University Museum.

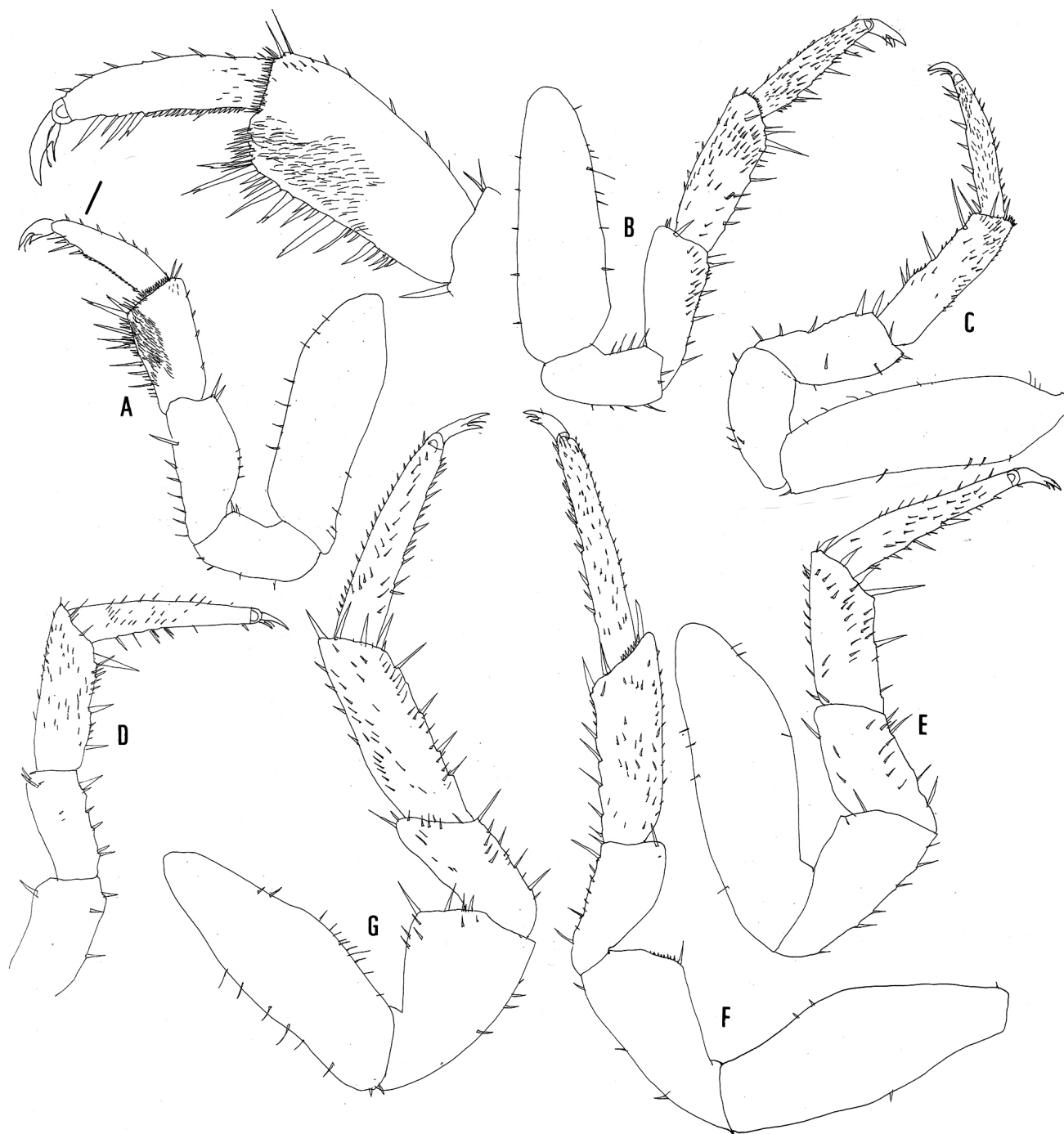


**Fig. 8** *Mongoloniscus ishikawai* n.sp.

A, Body(dorsal view); B, Cephalon(frontal view); C, Antennule; D, Antenna; E, Right mandible; F, Left mandible; G, Mesial endite of maxillula; H, Lateral endite of the same; I, Maxilla; J, Maxilliped; K, Penes and male pleopod 1; L, Male pleopod 2; M, Female pleopod 2; N, Pleopod 4; O, Pleopod 5; P, Uropod; R, Position of noduli lateralis, (All: holotype male).

*Description*: Body (Fig. 8A) 2.1 times as long as wide. Color brown, with a part of paler longitudinal patterns along the lateral border of each pereonal somite. Cephalon (Fig. 8B): linea frontalis roundly arched; linea supra-antennalis. Anterior margin with a low medial, without remarkably lappets on antero-lateral angle. Eyes mediocre in size, each eye with 20 ommatidia. All the noduli lateralis located near each lateral border (Fig. 8Q). Pleotelson triangular, with rounded tip.

Antennule (Fig. 8C) three-segmented; terminal somite with 6-7 aesthetascs at the tip. Antenna (Fig. 8D): second flagellar antennal segment 0.9 times as long as the first.



**Fig. 9** *Mongoloniscus ishikawai* n.sp.  
A-G, Pereopods 1-7(All: holotype male).



Right mandible (Fig. 8E): pars incisiva slightly concave; lacinia mobilis not chitinized and slightly concave; 4 penicils between hairy and processus molaris; processus molaris represented by a tuft of setae. Left mandible (Fig. 8F): pars incisiva 4-toothed; lacinia mobilis 3-toothed; 3 penicils; processus molaris represented by a tuft of setae. Maxillula (Fig. 8G and H): lateral endite with 10 simple teeth; mesial endite with 2 plumose setae and an acute projection. Maxilla (Fig. 8I): medial lobe narrow; lateral lobe wide. Maxilliped (Fig. 8J): endite rectangular; apically with 3 cusps and a strong seta; palp relatively slender; segment 2 with a seta apically, proximal segment with a tuft of setae.

Pereopod 1 (Fig. 9A): basis rectangular, 3.1 times as long as wide; ischium half as long as basis, with 4 setae on inner margin and 2 setae on sternal margin; merus a little longer than ischium, with 7 setae on inner margin and 2 setae on sternal margin; carpus 0.85 times long as merus, with antennal cleaning brush and 8 setae including 2 longer and bifurcated ones on inner margin and many short setae around the distal margin; propodus as long as carpus, with about 17 shorter setae on basal half and 4 longer setae on distal half of on inner margin; dactylus with a dactylar seta.

Pereopod 2 (Fig. 9B): basis rectangular, 3.1 times as long as wide; ischium 0.45 times as long as basis, with 5-6 setae on inner margin; merus 1.2 times as long as ischium, with 6-8 setae on inner margin; carpus a little longer than merus, with 10 setae on inner margin; propodus as long as merus, with 11-12 setae including a bifurcated one on inner margin; dactylus with a dactylar seta.

Pereopod 3 (Fig. 9C): basis rectangular, 3.3 times as long as wide; ischium half-length of basis, with 5-6 setae on inner margin; merus 0.85 times as long as ischium, with 5 setae on inner margin; carpus 1.2 times longer than merus, with 4 longer and more than 10 shorter setae on inner margin and 2 setae on distal margin; propodus 0.85 times as long as carpus, with 7 setae on inner margin and about a dozen short setae on outer margin; dactylus with a dactylar seta.

Pereopod 4 (Fig. 9D): merus with 5-6 setae on inner margin; carpus 1.3 times long as merus, with 3 stronger setae on inner margin; propodus 1.2 times as long as carpus, with 7-8 setae on inner margin; dactylus with a dactylar seta.

Pereopod 5 (Fig. 9E): basis rectangular, 3.3 times as long as wide; ischium 0.55 times as long as basis, with 6 setae on inner margin; merus 0.6 times as long as ischium, with 5-6 setae on inner margin; carpus 1.3 times longer than merus, with 3 stouter setae and several weaker setae on inner margin and 3 robust setae on distal margin; propodus a little longer than carpus, with 6 setae and several short ones on inner margin; dactylus with a dactylar seta.

Pereopod 6 (Fig. 9F): basis rectangular, 2.7 times as long as wide; ischium 0.7 times as long as basis, with 3 setae on inner margin; merus two-thirds as long as ischium, with 6 longer setae and several shorter ones on inner margin; carpus 1.3 times longer than merus, with 6 longer and some shorter setae on inner margin; propodus 1.5 times longer than carpus, with more than a dozen setae on inner margin; dactylus with a dactylar seta.

Pereopod 7 (Fig. 9G): basis 3 times as long as wide, with 6-8 setae on inner margin and more than a dozen setae on outer margin; ischium two-thirds as long as basis, with 3-4 setae on inner margin; merus two-thirds as long as ischium, with 5-6 setae and several shorter ones on inner margin; carpus 1.4 times longer than merus, with 4-5 longer setae on inner margin and 4 shorter setae on distal margin; propodus 1.2 times longer than carpus, dactylus with a dactylar seta.

Penes (Fig. 8K) fusiform, 4.2 times as long as the widest point, its tip slightly rounded.

Pleopod 1 (Fig. 8K): endopod straight and relatively robust, with a series of 9-10 denticles; exopod broad lanceolate, with very shallow and small concavity near the tip and without setae.

Pleopod 2 in male (Fig. 8L): endopod slender with an acute tip and only a bit exceeds the tip of exopod; exopod triangular, with 5 spines on outer margin.

Pleopod 3 (Fig. 8M): endopod rectangular; exopod rounded triangular, with outer margin only slightly concave, bearing 12 setae.

Pleopod 4 (Fig. 8N): endopod rectangular; exopod triangular, with 11-12 setae.

Pleopod 5 (Fig. 8O) smaller than the preceding ones; exopod triangular, with 7 pectinated scales and 11 setae on outer margin.

Uropod (Fig. 8P): peduncle almost square; endopod twice as long as peduncle, exopod 0.4 times as long as endopod.

Female: similar to male except sexual characters.

Etymology: The species named is dedicated to Dr. Kazuo Ishikawa, collector of the present species and a specialist of mesostigmatid acari.

*Remarks:* The present new species is most closely allied to *Mongoloniscus masahitoi* (Nunomura, 1987) reported from the Imperial Palace, Tokyo, but the former is separated from the latter in the following features: (1) longer basal flagellum of antenna, (2) shallower concavity of exopod of male first pleopod, (3) shorter endopod of male second pleopod, (4) numerous aesthetascs on antennule, (5) lack of apical area of mesial endite of maxillula and (6) presence of bifurcate of pereopods.

***Mongoloniscus nankaiensis* n.sp.**

**(Japanese name: Nankai-sato-warajimushi, new)**

**(Figs.10-11)**

*Material examined:* 2♂♂ (1♂ holotype, 5.7 mm in body length and 1♂ paratype, 5.3 mm in body length) and 10♀♀ (1♀ allotype, 5.2 mm in body length and 9♀♀ paratypes, 4.5-7.3 mm in body length) and 1 hermaphrodite (paratype 6.1mm in body length), Sunokawa-Park, Sunokawa, Ainan-cho, 3, June 2012, coll. Noboru Nunomura. Type series is deposited as follows: Holotype (TOYA Cr-23456), allotype (TOYA Cr-23457) and 4 paratypes (TOYA Cr-23458~23461) at Toyama Science Museum, Toyama, 3 paratypes (3♀♀, KMNH IvR 500,667~500,669) at Kitakyushu Museum of Natural History and Human History, Kitakyushu and 3 paratypes (OMNH Ar 9526~9528) at Osaka Museum of Natural History.

*Description:* Body (Fig.10A) 2.4 times as long as wide. Color brown, with a pair of paler area and darker area along lateral border of pereonal somites. Cephalon (Fig. 10B): linea frontalis trapezoidal; anterior margin low and rounded medial process and anterolateral projections. Eyes mediocre in size, each eye with 20 ommatidia. All the noduli lateralis (Fig.10Q) near from each lateral border.

Antennule (Fig.10B) three-segmented, terminal somite with 8 aesthetascs at the tip. Antenna (Fig. 10C), reaching the posterior border of pereonal somite 3; second flagellar segment 2.3 times as long as the first.

Right mandible (Fig.10E): pars incisiva with 3 teeth, lacinia mobilis 3-toothed; 2 penicils; processus molaris is represented by a tuft of setae. Left mandible (Fig. 10F): pars incisiva, 3-teeth; lacinia mobilis with 3 teeth with 2 plumose setae; 2 penicils; processus molaris represented by a tuft of setae. Maxillula: mesial endite (Fig.10G.) with 3 relatively short plumose setae and an acute projection; lateral endite (Fig.10H) with 10 simple teeth on its apical margin, with 10 simple teeth. Maxilla (Fig.10I): medial lobe wide; lateral lobe narrow. Maxilliped (Fig.10J): endite apically with 3 cusps and a strong seta; palp three-segmented; segment 2 with tuft of few setae apically, proximal segment with a seta.

Pereopod 1 (Fig.11A): basis rectangular, 2.8 times as long as wide, with 10 short setae on inner margin; ischium a little longer than half-length of basis, with 7-9 setae on inner margin; merus two-thirds as long as ischium, with 10-11 setae including 2 bifurcated ones on inner margin; carpus 1.2 times long as merus, with 7-8 bifurcated longer setae and several simple shorter setae on inner margin and antenna-grooming brush on frontal margin; propodus as long as carpus, with 3 setae on distal half and 7-8 setae on basal half of inner margin; dactylus with a dactylar seta.

Pereopod 2 (Fig.11B): basis rectangular, 3.8 times as long as wide; ischium 0.45 times as long as basis, with 5-6 setae on inner margin; merus 0.7 times as long as ischium, with 11-12 setae on inner margin and a long seta at outer distal angle; carpus 0.8 times long as merus, with many setae on inner margin; propodus two-

thirds as long as carpus, with 4-6 setae on inner margin ; dactylus with a dactylar seta.

Pereopod 3 (Fig.11C): basis rectangular, 2.9 times as long as wide; ischium with 6-7 setae on inner margin ; merus a little longer than ischium, with 13-15 setae on inner margin; carpus as long as merus, with 16-18 relatively long setae including several bifurcated ones on inner margin; propodus a little shorter than carpus, with 10-11 setae on inner margin ; dactylus with a dactylar seta.

Pereopods 4-5 similar in shape. Pereopod 5(Fig.11D): basis rectangular, 2.8 times as long as wide with 11-12 short setae on outer margin; ischium half-length of basis, with 6-7 setae on inner margin ; merus about 0.7

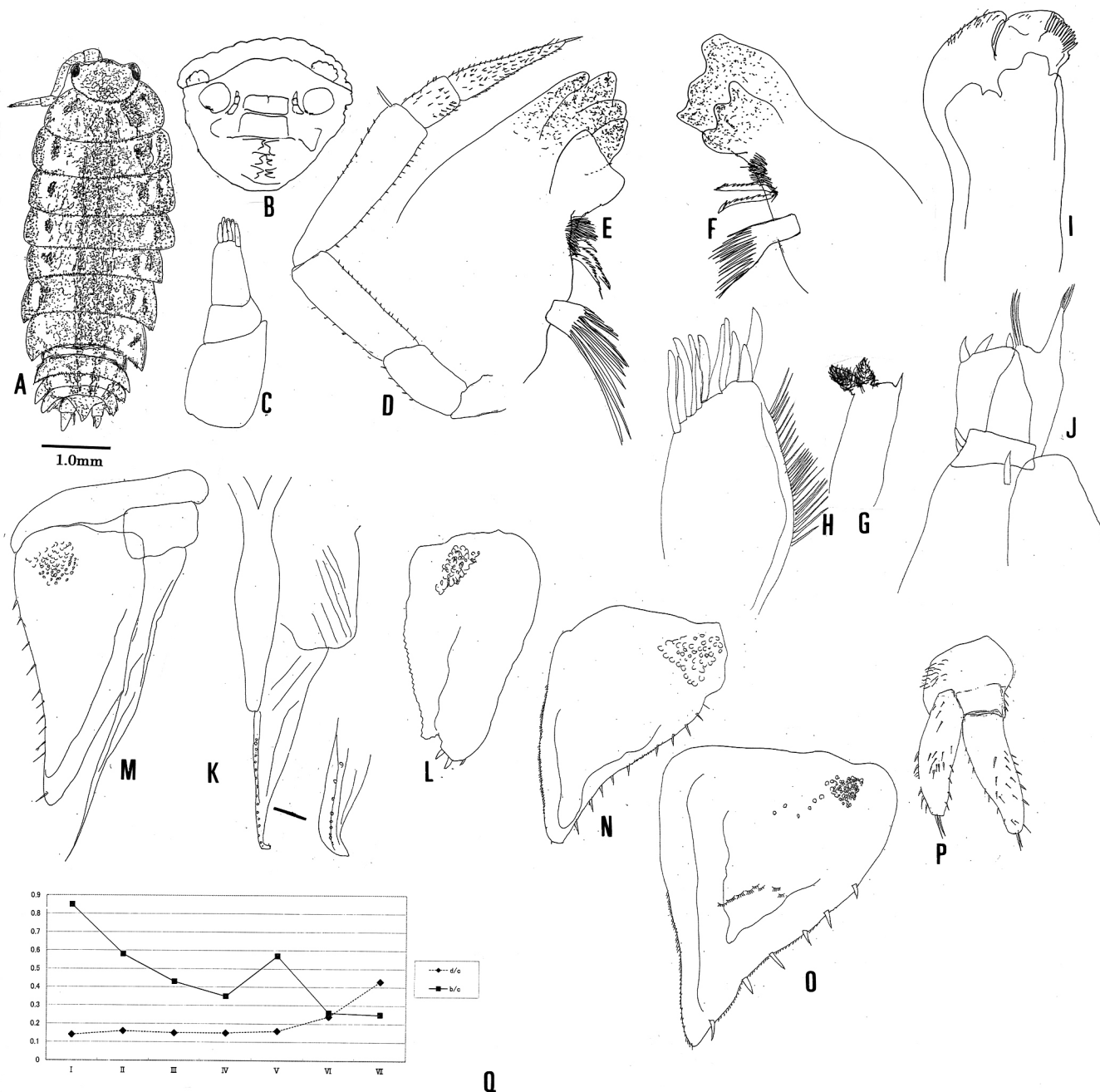


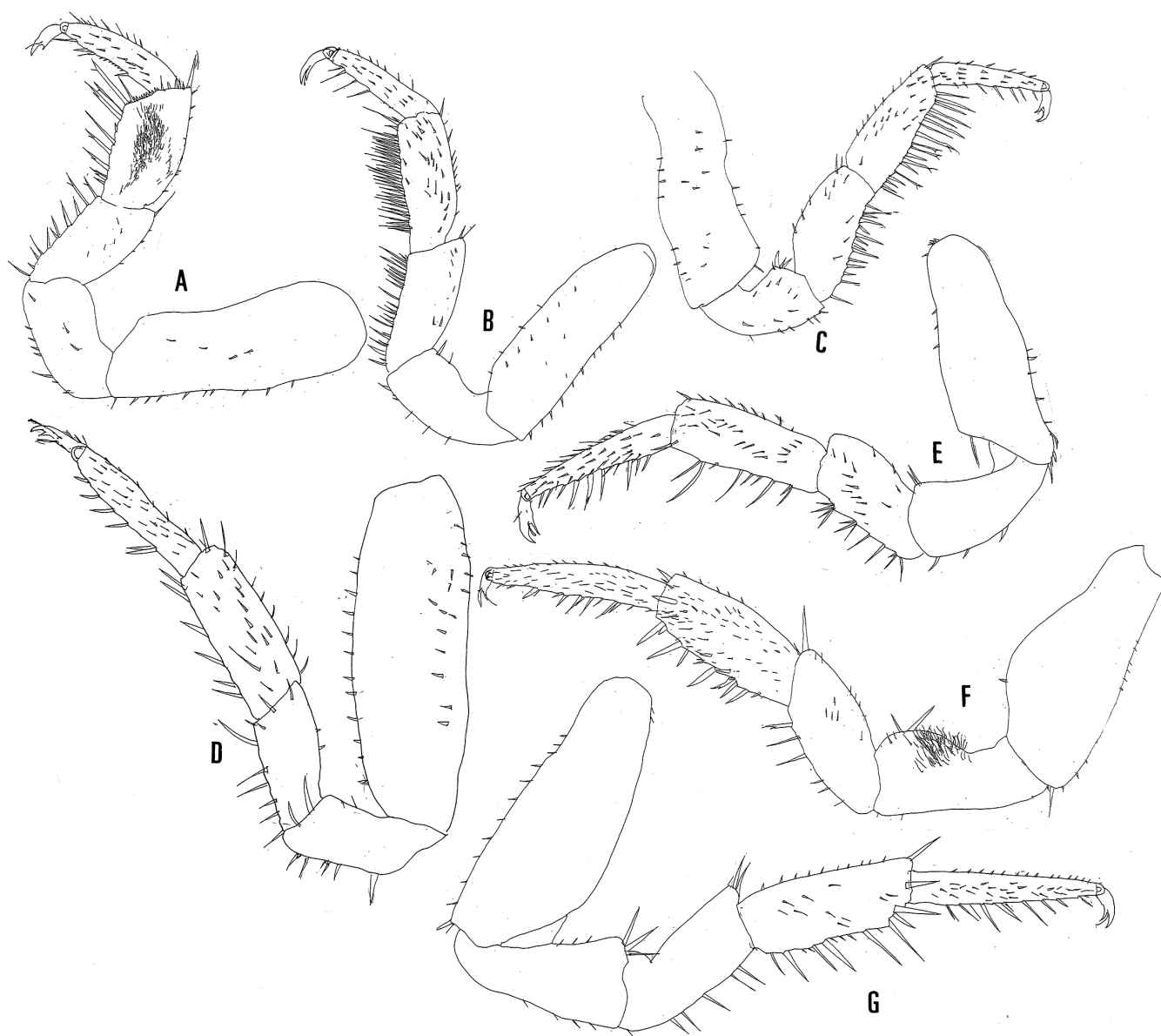
Fig.10 *Mongoloniscus nankaiensis* n.sp.

A, Body (dorsal view); B, Cephalon; C, Antennule; D, Antenna; E, Right mandible; F, Left mandible; G, Mesial endite of maxillula; H, Lateral endite of the same; I, Maxilla; J, Maxilliped; K, Penes and endopod of male pleopod 1; L, Exopod of the same; M, Male pleopod 2; N, Pleopod 3; O Pleopod 5; P, Uropod; Q, Position of noduli lateralis(All: holotype male).

times as long as ischium, with 5-6 setae on inner margin; carpus a little longer than merus, 6-7 with setae on inner margin; propodus a little shorter than carpus, with 5 setae on inner margin; dactylus with a dactylar seta.

Pereopod 6 (Fig.11E): basis rectangular, 3.0 times as long as wide; ischium 0.6 times as long as basis, with 3 setae on inner margin; merus 0.8 times as long as ischium, with 4-5 setae on basal half and 2 groups of 3-4 setae on distal half of inner margin; carpus 1.2 times longer than merus, with 4 longer setae and 5-6 shorter setae on inner margin; propodus a little longer than carpus, with 9-10 setae on inner margin; dactylus with a dactylar seta.

Pereopod 7 (Fig.11F): basis 2.2 times as long as wide, with a seta at inner distal angle and a dozen short setae on inner margin; ischium 0.6 times as long as basis, with much hair on outer area, and 2 longer and several shorter setae on inner margin; merus four-fifths as long as ischium, with 6 setae including a bifurcated one on inner margin and a strong seta at outer distal angle; carpus a little longer than merus, with 8-9 stronger setae and several weaker setae on inner margin; propodus 0.9 times as long as carpus, with 13-15 setae on



**Fig.11** *Mongoloniscus nankaiensis* n.sp.

A-C, Pleopods 1-3, D-E, Pleopods 5-6, F, Pleopod 7 in male, G, Pleopod 7 in female, (A-F: holotype male; G: allotype female).

inner margin; dactylus with a dactylar seta.

Penes (Fig.10K) fusiform, 5 times as long as widest area, tip rounded and truncated.

Pleopod 1(Fig.10 K and L): endopod straight, apical part slightly bents outer ward, with a series or about more than 16 denticles; exopod triangular apical concavity narrow, with setae, outer margin sinuate and with 3 setae.

Pleopod 2 in male (Fig.10M): endopod slender with an acute tip and exceeds beyond the tip of exopod; exopod triangular, with 11 spines on outer margin, but without any concavity.

Pleopod 3 (Fig.10N): endopod rectangular, exopod triangular, without any distinct concavity, and with 10 setae on outer margin.

Pleopod 4: endopod rectangular, exopod triangular with 9 setae.

Pleopod 5 (Fig.10O) smaller than the preceding ones : endopod rectangular; exopod triangular, with a series of pectinated setae on lateral surface and 6 setae on outer margin.

Uropod (Fig.10P): peduncle almost square, endopod relatively stout, about twice as long as peduncle; exopod a little shorter than exopod.

Female similar to male except sexual characters and lacking dense setae on ischium of pereopod 7 (Fig.11G).

Etymology: the species name is after the type locality, Shikoku Dialect, was included “Nankai-do” which means the area located southward of capital.

*Remarks*: The present new species is most closely allied to *Mongoloniscus maculates* (Iwamoto, 1943), distributed in central Japan in having a small but distinct concavity on exopod of male first pleopod, but the former is separated from the latter in the following features: (1) more distinct patterns on dorsal surface of pereonal somites, (2) sinuated inner margin of exopod of male first pleopod, (3) less protruded outer margin of ischium of seventh pereopod, (4) numerous setae on carpus of seventh pereopod and (5) numerous aesthetascs of antennule.

***Mongoloniscus odamiyamaensis* n.sp.**

**(Japanese name: Odamiyama-sato-warajimushi, new)**

**(Figs.12-13)**

*Material examined*: 3♂♂(1♂ holotype, 6.3 mm in body length and 2♂♂, paratypes, 5.9-6.4mm in body length) and 2♀♀(1♀, allotype 6.6 mm in body length and 1♀, paratype, 6.2 mm in body length), bamboo thicket and forest of miscellaneous trees, Odamiyama, Uchiko-cho, 11, July 1995, coll. Eiji Yamamoto.

Type series is deposited as follows: Holotype (TOYA Cr-23492), allotype (TOYA Cr-23493) and a paratype (TOYA Cr-23494) at Toyama Science Museum, Toyama, a paratype at Ehime University Museum, and a paratype (1♂, KMNH IvR 500,664) at Kitakyushu Museum of Natural History and Human History, Kitakyushu.

*Description*: Body (Fig.12A) 2.5 times as long as wide. Color pale brown, with round darker spots on each pereonal somite. Cephalon (Fig.12B) linea frontalis curved. Anterior margin of cephalon low and rounded medial process and anterolateral projections. Eyes mediocre in size, each eye with 12-13 ommatidea. Noduli lateralis (Fig.12R) on pereonal somites 1-5 near from each lateral border and on pereonal somites 6-7 situated relatively posterior and inner part.

Antennule (Fig.12C): three-segmented, terminal somite with 6 aesthetascs at the tip. Antenna (Fig.12D): fifth peduncular segment without longer seta on distal area; second flagellar segments 3.5 times as long as the first.

Right mandible (Fig.12E): pars incisiva 3-toothed, lacinia mobilis single-toothed; 3 penicils; processus molaris is represented by a single seta. Left mandible (Fig.12F): pars incisiva 4-toothed; lacinia mobilis with 3 teeth; hairy with a plumose seta; processus molaris represented by a tuft of setae. Maxillula: mesial endite (Fig.12G) with 2 plumose setae and an acute projection on its apical margin; lateral endite (Fig.12H) with 10 simple teeth. Maxilla (Fig.12I): medial lobe wide; lateral lobe narrow. Maxilliped (Fig.12J): endite rectangular; apically



with a strong seta; palp relatively slender three-segmented; segment 2 with tuft of a few setae apically, proximal segment with a seta; epipodite slender.

Many of the pereopods with many setae including characteristic robust setae, spreading toward the tip; basal part stout and tip often trifurcated. Pereopod 1(Fig.13A):basis rectangular, 3.8 times as long as wide, with 8-12 setae on both margins; ischium 0.55 times as long as basis, with 7-8 setae on inner margin and a seta at



Fig.12 *Mongoloniscus odamiyamaensis* n.sp.

A, Body(dorsal view); B, Cephalon(frontal view); C, Antennule; D, Antenna; E, Right mandible; F, Left mandible; G, Mesial endite of maxillula; H, Lateral endite of the same ; I, Maxilla; J, Maxilliped; K, Penes and male pleopod 1; L, Exopod of male pleopod 1; M, Male pleopod 2, N, Female pleopod 2; O, Pleopod 3; P, Pleopod 4; Q, Pleopod 5 ; R, Uropod; S, Position of noduli lateralis,(A-M, O-S: holotype male, N: allotype female).

outer distal angle ; merus approximately as long as ischium, with about 20 setae on inner margin; carpus approximately as long as merus, with antenna-grooming brush on frontal surface and more than a dozen stout setae on distal area inner margin; propodus 0.85 times as long as carpus, with 12-13 shorter setae on basal half and 3 longer trifurcated setae on distal half of inner margin; dactylus with a strong outer claw, narrower inner claw, a dactylar seta.

Pereopod 2 (Fig.13B): basis rectangular, 2.7 times as long as wide, with 9-11 setae on both margins; ischium 0.45 times as long as basis, with 10-12 setae on inner margin and 2 relatively strong setae on outer margin; merus a little shorter than ischium, with many setae on inner margin and 2 setae at outer distal angle; carpus 1.4 times longer than merus, with 17-18 setae on inner margin; propodus three- fourths as long as carpus, with 5 strong and several weak setae on inner margin; dactylus with a dactylar seta.

Pereopod 3 (Fig.13C): basis rectangular, 3.3 times as long as wide; ischium half-length of basis, with more than 15 setae on inner margin ; merus a little shorter than ischium, with 7 stouter and several weaker setae on inner margin; carpus 1.4 times longer than merus, with many setae including 4 distal stronger ones on inner

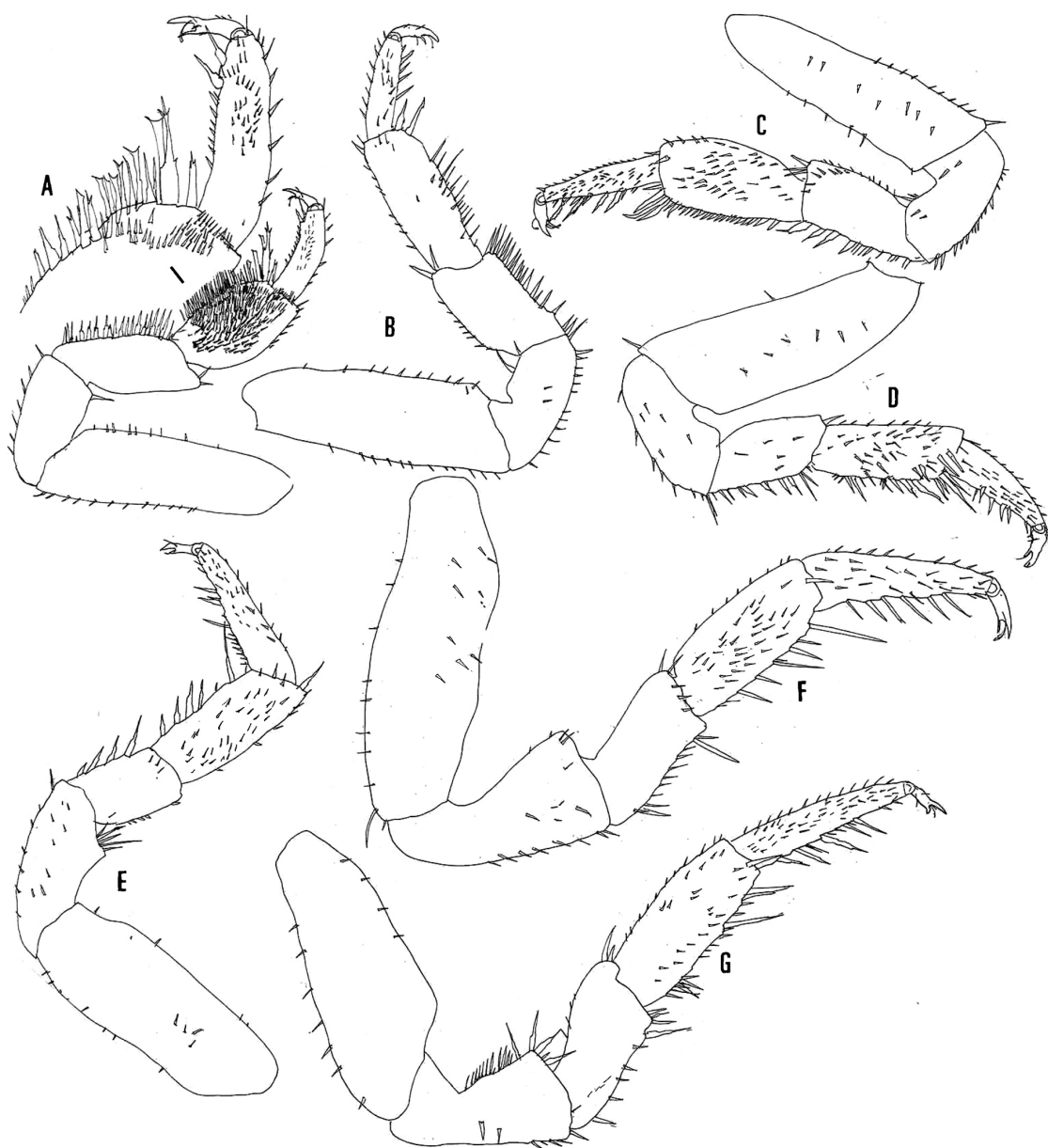


Fig.13 *Mongoloniscus odamiyamaensis* n.sp.

A-G, Pereopods 1-7(All: holotype male).



margin; propodus a little shorter than carpus, with 5 stronger setae and a few of weaker ones on inner margin; dactylus with a dactylar seta.

Pereopod 4 (Fig.13D): basis rectangular, 2.8 times as long as wide; ischium 0.6 times as long as basis, with 9-10 setae on inner margin; merus 0.7 times as long as ischium, with about a dozen setae including 4 stouter ones on inner margin; carpus 1.4 times long as merus, with more than a dozen setae including 5-6 stronger ones on inner margin; propodus 0.8 times as long as carpus, with 6 stronger setae on inner margin; dactylus with a dactylar seta.

Pereopod 5 (Fig.13E): basis rectangular, 2.8 times as long as wide; ischium 0.7 times as long as basis, with 6-7 setae on inner margin and 3-5 setae at outer distal angle; merus 0.6 times as long as ischium, with 4-7 stronger setae on inner margin; carpus 1.4 times longer than merus, with 4 stronger setae including a remarkably long one on inner margin; propodus a little longer than carpus, with 3 stronger setae and 7-8 shorter setae on inner margin; dactylus with a dactylar seta.

Pereopod 6 (Fig.13F): basis rectangular, 2.8 times as long as wide; ischium two-thirds as long as basis, with 7-8 setae on inner margin and a stronger tooth at the outer distal angle; merus 0.6 times as long as ischium, with 12-14 setae including stronger ones on inner margin; carpus 1.5 times longer than merus, with about 10 stronger setae and several weaker ones on inner margin; propodus approximately as long as carpus, with 10-12 setae including 4 stronger ones on inner margin; dactylus with a dactylar seta.

Pereopod 7 (Fig.13G): basis 2.5 times as long as wide; ischium, 0.6 times as long as basis, with 5-6 setae on inner margin a series of about a dozen setae on outer margin and 4 setae on outer distal angle; merus 0.85 times as long as ischium, with 10-12 setae on inner margin; carpus 1.2 times long as merus, with 3 long and 15-16 setae on inner margin; propodus as long as carpus, with 5 long setae and several shorter setae on inner margin; dactylus with a dactylar seta.

Penes (Fig.12K) rectangular, 7.5 times as long as wide.

Pleopod 1: endopod (Fig.12K) straight, apical part slightly bent outer-ward, with a series of more than 30 denticles; exopod (Fig.12 L) triangular apical area protruded, with 2 setae, outer margin slightly sinuate on distal half.

Pleopod 2 in male (Fig.12M): endopod slender, with an acute tip, shorter than exopod and without protrusion; exopod triangular, with 10 spines outer margin.

Pleopod 3 (Fig.12O): endopod rectangular, exopod triangular, outer margin slightly concave, bearing 12 setae.

Pleopod 4 (Fig.12P): exopod triangular with 12 setae.

Pleopod 5 (Fig.12Q): endopod rectangular; exopod triangular, with small area of pectinated scales on surface and 5 setae on the central area.

Uropod (Fig.12Q): peduncle rectangular; endopod slender, 1.8 times as long as peduncle; exopod two-thirds as long as endopod.

Female similar except for the sexual characters including pleopod 1-2 (Fig.12M).

Etymology: "Odamiyama" is the name of type locality.

*Remarks*: The present new species is most closely allied to *Mongoloniscus nankaiensis* already described in this paper but the former is separated from the latter in the following features: (1) presence of characteristic robust setae on pereopods, (2) wide antenna-grooming brush area, (3) smoother apical area of exopod of male first pleopod, (4) presence of many setae on outer area of male sixth pereopod, (5) numerous setae on male endopod of male first pleopod, (6) shorter endopod of male second pleopod, (7) numerous setae on carpus of third pereopods and (8) remoter position of noduli lateralis on perenal somites 6-7.

*Mongoloniscus amabilis* n.sp.

(Japanese name: Tekona-sato-warajimushi, new)

(Figs.14-15)

*Material examined*: 5♂♂ (1♂ holotype, 5.1mm in body length and 4♂♂ paratypes, 5.0~6.1 mm in body length, 4♀♀ (1♀ allotype, 6.9 mm in body length 3♀♀, paratypes, 3.5-3.9 mm in body length), Kuwabara, Matsuyama-shi, 24, Oct.1978, coll. Kazuo Ishikawa. Type series is deposited as follows: holotype (TOYA Cr-23498), allotype (TOYA Cr-23499) and 3 paratypes (TOYA Cr 23500~23502) at Toyama Science Museum, 2 paratypes at

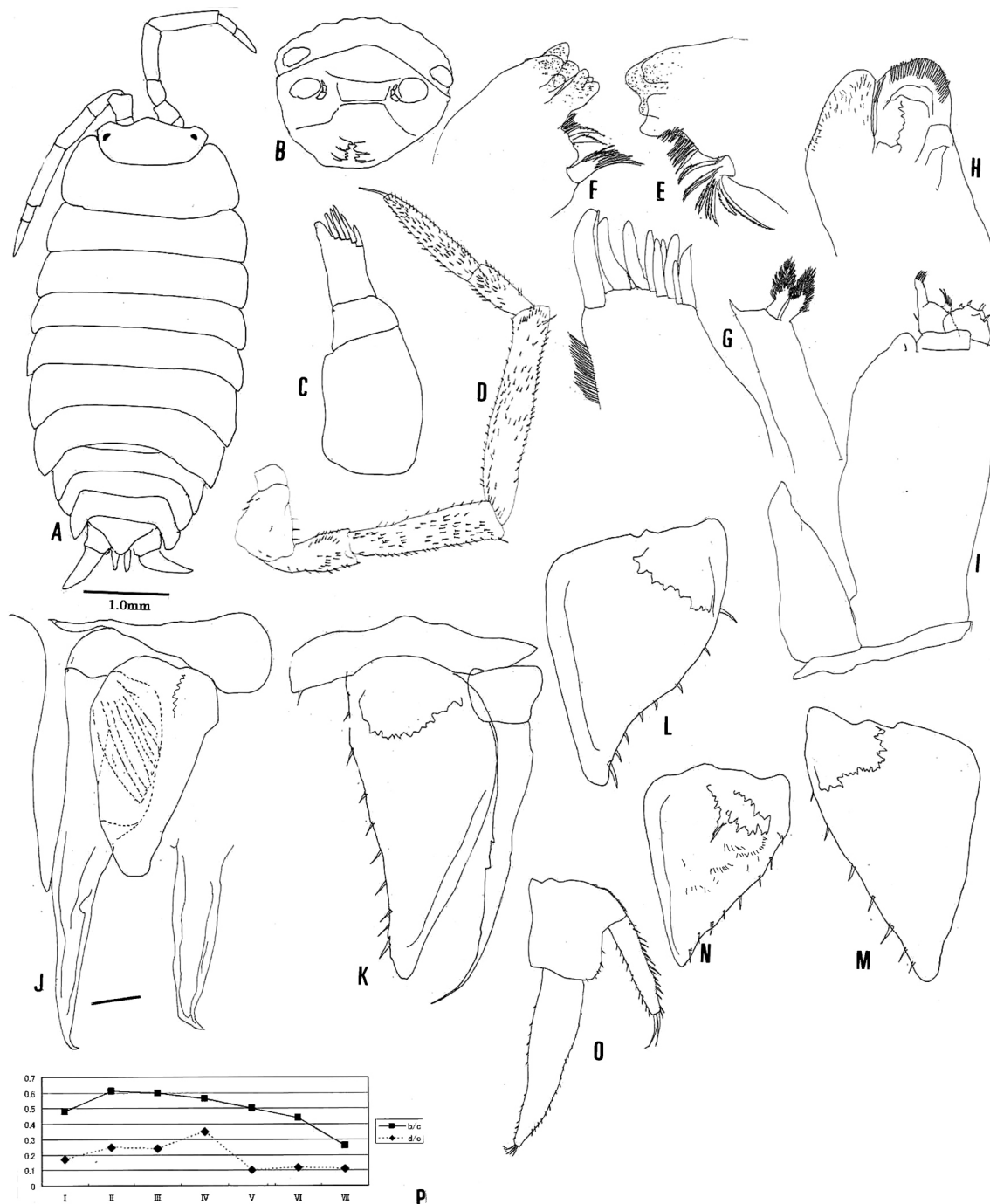


Fig.14 *Mongoloniscus amabilis* n.sp.

A, Body (dorsal view); B, Cephalon (frontal view); C, Antennule; D, Antenna; E, Right mandible; F, Left mandible; G, Maxillula; H, Maxilla; I, Maxilliped; J, Penes and male pleopod 1; K, Male pleopod 2; L, Pleopod 3; M, Pleopod 4; N, Pleopod 5; O, Uropod; P, Position of noduli lateralis (All: holotype male).

Ehime University Museum and 2 paratypes (1♂, KMNH IvR 500,678 and 1♀, KMNH IvR 500,679).

*Description:* Body (Fig.14A), ellipsoid, 2.0 times as long as wide. Color pale yellow. Cephalon (Fig.14B) linea frontalis bent obtusely; linea supra-antennalis almost straight. Anterior margin of cephalon with a low medial process and low anterolateral process. Eyes small, each eye with 22 ommatidia. All the noduli lateralis (Fig.14P) on pereonal somites relatively near form the lateral border. Posterior margin of pleotelson rounded.

Antennule (Fig.14C) three-segmented, terminal segment with a protrusion and 5 aesthetascs at the tip. Antenna (Fig.14D): mutual length of 5 peduncular segments is 1: 3: 4: 6: 9.5; flagellum 0.8 times as long as the fifth pereonal somite; second flagellar segment 1.9 times longer than the first.

Right mandible (Fig.14E): pars incisiva with 3 teeth; lacinia mobilis not chitinized, with a straight apical margin; hairy lobe with a few spines and 2 penicils; processus molaris represented by a tuft of setae. Left mandible (Fig.14F): pars incisiva with 4 teeth; lacinia mobilis chytinized, with 3 teeth; hairy lobe with a few spines and 3 penicils; processus molaris represented by a tuft of setae. Maxillula (Fig.14G): lateral endite with 10 simple teeth; mesial endite with 2 plumose setae and an acute projection. Maxilla (Fig.14H): medial lobe relatively narrow; lateral lobe narrow. Maxilliped (Fig.14I): endite rather short and rounded, apically with 3 cusps and a strong seta; palp relatively slender; segment 2 with a seta apically, proximal segment with a tuft of setae.

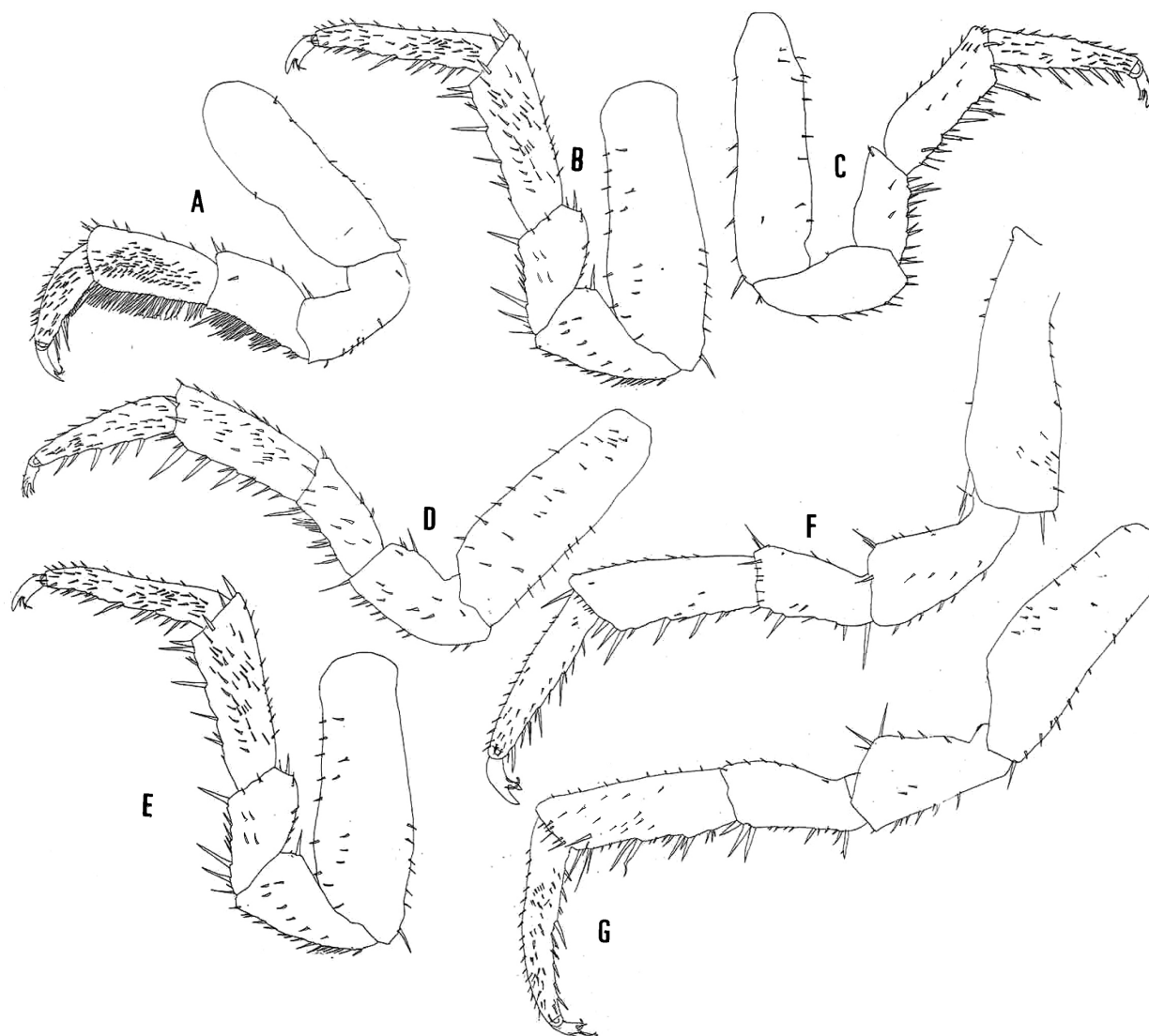


Fig.15 *Mongoloniscus amabilis* n.sp.

A-G. Pereopods 1-7 (All: holotype male).

Pereopod 1 (Fig.15A): basis 3.2 times as long as wide; ischium 0.45 times as long as basis, with 7-8 setae on inner margin and a seta on outer margin; merus as long as ischium, with 28-30 long setae on inner margin; carpus a little longer than merus, with many setae on inner margin and a brush for cleaning the antenna on frontal surface; propodus 0.85 times as long as carpus, with 5 longer and several shorter setae on inner margin; dactylus with a dactylar seta.

Pereopod 2 (Fig.15B): basis 3.1 times as long as wide; ischium less than half length of basis; merus a little shorter than ischium, with more than 5 longer and several shorter setae on inner margin; carpus 1.6 times longer than merus, with 7-8 setae including several setae on lateral margin; propodus 1.1 times as long as wide, with 16-17 setae on inner margin; dactylus with a dactylar seta.

Pereopod 3 (Fig.15C): basis 3.4 times as long as wide; ischium half-length of basis, with 9-10 setae on inner margin; merus two-thirds length of ischium, with 11-12 setae on inner margin; carpus 1.6 times longer than merus, with about a dozen setae including 3 trifurcated longer ones; propodus as long as carpus, with 8 setae on inner margin; dactylus with a dactylar seta.

Pereopod 4 (Fig.15D): basis 3.0 times as long as wide; ischium 0.55 times as long as wide, with 10 setae on inner margin, with 10 setae on inner margin; merus 0.6 times as long as ischium; carpus 1.6 times longer than merus, with 6-7 stronger and 4-5 weaker setae on inner margin; propodus approximately as long as carpus, with 6 setae on inner margin; dactylus with a dactylar seta.

Pereopod 5 (Fig.15E): basis 2.9 times as long as wide; ischium 0.7 times as long as basis, with more than 15 setae on inner margin and a seta at outer margin; merus 0.7 times as long as ischium, with 4 setae and several short setae on inner margin and 7-8 setae on outer margin; carpus 1.5 times as long as merus, with 5-6 stronger teeth and several weaker setae on inner margin; propodus a little longer than carpus, with 13-15 setae; dactylus with a dactylar seta.

Pereopod 6 (Fig.15F): basis 3.1 times as long as wide, with a relatively long seta at inner distal area; ischium two-thirds as long as basis; merus about half-length of ischium, with 5-6 setae including a longer one on inner margin; carpus as long as ischium, with 8-10 longer setae and a few of shorter setae on inner margin; propodus as long as carpus, with a dozen setae on inner margin; dactylus with a dactylar seta.

Pereopod 7 (Fig.15G): basis 3.4 times as long as wide, with a relatively long seta at inner distal area; ischium 0.55 times as long as basis, with 3 relatively long setae on sternal margin; merus 0.8 times as long as ischium, with 7-8 longer and several shorter setae on inner margin; carpus 1.4 times longer than merus, with 7-8 stronger and 10-12 weaker setae on inner margin; propodus as long as carpus, with 9-11 setae on inner margin and 16-17 setae on outer margin; dactylus with a dactylar seta.

Penes (Fig.14J) fusiform but narrow, 8.5 times as long as wide.

Pleopod 1 (Fig.14J): endopod straight and apical tip bent outwards and tapering, no denticles observed; exopod rectangular, without any concavity and spines.

Pleopod 2 (Fig.14K): endopod slender, with an acute tip and exceeds longer than the tip exopod; exopod, elongated, 2.3 times as long as wide, with 9 spines on outer margin, apical part rounded outer margin straight.

Pleopod 3 (Fig.14L): exopod triangular its outer margin slightly concave, bearing 8 setae.

Pleopod 4 (Fig.14M): exopod triangular with 7 setae on outer margin.

Pleopod 5 (Fig.14N) smaller than the preceding ones; exopod triangular, with 4 groups of pectinated scales and 8 setae on outer margin.

Uropod (Fig.14O) peduncle almost square; endopod 1.8 times longer than exopod; Exopod slender, three-fifths as long as endopod.

Female similar except for the sexual characters including pleopod 1-2.

Etymology: "*amabilis*" means "lovable" in Latin.

Japanese name "*tekona*" means "beautiful girl" in archaic Japanese word.

*Remarks*: The present new species is unique in the genus in having white body.

It is a little allied to *Mongoloniscus ishikawai* already described in this paper, but the present new species is separated from *ishikawai* in the following features : (1) white body, (2) shorter first flagellar segment of antenna, (3) longer exopod of male first pleopod, (4) longer exopod of male second pleopod, (5) obliquely bent tip of endopod of male first pleopod., (6) scattered pectinated scales on exopod of pleopod 5 and (7) lack of denticles on male first pleopod.

***Mongoloniscus* sp.**

*Materials examined*: 1 ♀, bamboo forest, downstream of Shigenobu-gawa, Kitagawara, Masaki-cho, Iyo-shi, 9, Apr. 2004, coll. Eiji Yamamoto.

***Agnara* spp.**

*Materials examined*: 4 ♀ ♀, Uchiko-cho, 3, July 1995, coll. Eiji Yamamoto; 5 ♀ ♀, Nenbutsu-yama, Miyakubo-cho, Imabari-shi, coll. Toshiki Mohri; 5 ♀ ♀, Matsuo, Kikuma, Imabari-shi. 29, Apr. 2012, coll. Kazuo Ishikawa.

***Spherillo dorsalis* (Iwamoto, 1943)**

**(Japanese name: Seguro-koshihiro-danngomushi)**

*Armadillo dorsalis* Iwamoto, 1943, p. 30, fig. 23.

*Sphaeriilo dorsalis* (Iwamoto, 1943); Nunomura, pp. 13-15, fig. 143.

*Venzillo dorsalis* (Iwamoto, 1943); Nunomura, 1998, p. 4.

*Spherillo dorsalis* (Iwamoto, 1943); Nunomura, 2006, p. 89.

*Material examined*: 1 ♂ 2 ♀ ♀, Shiroyama, Matsuyama-shi, 16, Mar. 2008, coll. Eiji Yamamoto; 3 ♀ ♀, Tada, Oozu-shi, 2008, coll. Eiji Yamamoto; 2 ♀ ♀, Masagoya, Odamiyama, 2, May 1994, coll. Eiji Yamamoto; 3 ♀ ♀, Keikoku, Odamiyama, 6, Sep. 1994, coll. Eiji Yamamoto; 1 ♀, Odamiyama, 2, June 1994, coll. Eiji Yamamoto; 1 ♂ 5 ♀ ♀, Odamiyama, 11, July 1995, coll. Eiji Yamamoto; 1 ♂, Modo, Tanbara, 14, Feb. 1970, coll. Kazuo Ishikawa; 5 ♀ ♀, Uchimiya, Matsuyama-shi, 14, May 1975, coll. Kazuo Ishikawa; 1 ♂, Awaji Pass, Matsuyama-shi, 5, Sep. 1976, coll. Kazuo Ishikawa; 1 ♂ 1 ♀, Oomishima, 3, Nov. 1972, coll. Kazuo Ishikawa; 1 ♀, Shitama, Yawatahama-shi, 12, Sep. 2012, coll. Toshiki Mohri; 1 ♀, Yoshiumichou-yawata, 24, Nov. 2012, coll. Toshiki Mohri; 1 ♂, Toryo, alt 480m, Tomisato, Iyomishim-shi, 16, Nov. 1998, coll. Shuhei Nomura; 4 ♂ 1 ♀, Kirouzan, Yoshiumi-cho, 23, Feb. 2013, coll. Toshiki Mohri; 1 ♂, Kutsunajima Hachimangu, Oura, Is. Nakajima, Matsuyama-shi, 9, July 2009, coll. Nobuo Tsurusaki; 1 ♀, Sunohana, Nakajima-cho, 7, Oct. 1991, coll. Noboru Nunomura; 1 ♀, Kashima, Hojo-shi, 8, Oct. 1991, coll. Noboru Nunomura; 1 ♀, Shono Ikata-cho, 8, Apr. 2012, coll. Noboru Nunomura.

***Spherillo pachysetifer* n.sp.**

**(Japanese name: Futoge-koshihiro-danngomushi)**

**(Figs 16-17)**

*Material examined*: 5 ♂ ♂ (1 ♂ holotype, 7.3 mm in body length and 4 ♂ ♂ paratypes, 5.6-6.5 mm in body length and 4 ♀ ♀ (1 ♀ allotype, 5.7 mm in body length, 3 ♀ ♀, paratypes, 3.3-6.6 mm in body length), Tsushimachotakata, Uwajima-shi, 3, June 2012, coll. Noboru Nunomura.

Type series is deposited as follows: holotype (TOYA Cr-23495), allotype (TOYA Cr- 23496) and a paratype (TOYA Cr- 23497) at Toyama Science Museum, 2 paratypes (OMNH Ar 9529~530) at Osaka Museum of Natural History, 2 paratypes at Ehime University Museum and 2 paratypes (1 ♂, KMNH IvR 500,665 and 1 ♀, KMNH IvR 500,666), Kitakyushu Museum of Natural History and Human History, Kitakyushu.

Non-type: 2 ♂ ♂ (5.0-5.6 mm in body length) 3 ♀ ♀ (3.4-6.6 mm in body length) Micho-jinja, Uchiko, 22, June 1997, coll. Kiyoshi Ishii; 8 ♂ ♂ 29 ♀ ♀, Uchiko-cho, 13, Aug. 1995, coll. Eiji Yamamoto; 1 ♂ 5 ♀ ♀, Uchiko-cho, 14, Oct. 1995, coll. Eiji Yamamoto.

*Description*: Body (Fig. 16A) ellipsoid, 2.3 times as long as wide. Color blackish, with many irregular paler patterns. Cephalon (Fig. 16B) rectangular in dorsal view; linea frontalis bent obtusely; linea supra-antennalis also



bent obtusely; anterior margin of cephalon low and rounded medial process and anterolateral projections. Anterior margin of cephalon slightly protruded in dorsal view. Ventral site of pereonal somite 1 (Fig.16C) with a deep schisma and a groove. Pereonal somite 2 with a pair of teeth. Tergites almost smooth, with minute granules. Posterior margin of pleotelson (Fig.16D) hour-grass-shaped.

Antennule (Fig.16E) three-segmented; terminal segments bear 7-8 aesthetascs at the tip. Antenna (Fig.16F): second flagellar segment 4 times longer than the first.

Right mandible (Fig.16G): pars incisiva 3-toothed; lacinia mobilis with 3 penicils; processus molaris represented by a single seta. Left mandible (Fig.16H): pars incisiva 4-toothed; lacinia mobilis 3-toothed; 2 penicils behind the lacinia mobilis; processus molaris represented by a single seta. Maxillula (Fig.16I): mesial endite with 2 robust hairy penicils but without acuminate penicils; lateral endite with 10 simple teeth on distal margin.



**Fig.16** *Spherillo pachysetifer* n.sp.

A, Body (dorsal view); B, Cephalon(frontal view); C, Schisma of pereonal somites 1-2(ventral view) D, Pleotelson and left uropod(dorsal view); E, Antennule; F, Antenna; G, Right mandible; H, Left mandible; I, Maxillula; J, Maxilla; K, Maxilliped; L, Penes and male pleopod 1; M, Female pleopod 1; N, Male second pleopod; O, Female pleopod 2; P, Pleopod 3; Q, Pleopod 4; R, Pleopod 5; S, Uropod(All :holotype male).

Maxilla (Fig.16J) bilobed: mesial lobe rather wide. Maxilliped (Fig.16K): endite rectangular with 2 spurs distal margin; palp relatively short.

Pereopod 1 (Fig.17A): basis with 9 setae on inner margin; ischium half-length of basis, with 4 setae on inner margin; merus 0.6 times as long as ischium, with 11-12 robust setae on inner margin and 3 setae at outer distal area; carpus as long as merus, with an antenna glooming brush on frontal surface, 13-15 robust setae on inner margin; propodus with about 17-18 shorter setae on basal half and 3 longer setae on distal half of inner margin; dactylus with a dactylar seta.

Pereopod 2 (Fig.17B): basis with 12-13 setae on inner margin and with 5 setae on inner margin; ischium half-length of basis, with 8-9 setae on inner margin, 2 setae on sternal margin; merus 0.7 times as long as ischium, with 6-7 robust setae on inner margin; carpus 1.25 times longer than merus, with 8-9 robust setae and 3 normal one on inner margin; propodus 1.2 times longer than carpus, with about 4 robust setae on inner margin; dactylus with a dactylar seta.

Pereopod 3 (Fig.17C): basis 3.4 times as long as wide, with 10 setae on outer margin; ischium half-length of basis, with 8-9 setae on inner margin, a seta on sternal margin; merus 0.8 times as long as ischium, with 7 robust setae and a few of normal ones on inner margin; carpus with 6-7 robust setae on inner margin and



Fig.17 *Spherillo pachysetifer* n.sp.

A-G. Pereopods 1-7. (A-D, F-G, holotype male; E, paratype male).



4 setae including a robust one on distal end; propodus almost as long as carpus, with 2 robust and 5-6 short setae on inner margin; dactylus with a dactylar seta.

Pereopod 4 (Fig.17D): basis 3.6 times longer than wide, with 9-10 setae on inner margin; ischium less than half length of basis, with 3 setae on inner margin; merus 0.8 times as long as ischium with 5 setae including a long and robust one; carpus 1.3 times longer than merus, with 9-10 setae including a robust and long one inner margin; propodus a little longer than carpus, with about 7 setae on inner margin; dactylus with a dactylar seta.

Pereopod 5 (Fig.17E): basis 3.6 times as long as wide; ischium 0.6 times as long as basis, with 3 stronger and a few of weaker setae on inner margin; merus two-thirds as long as ischium, with 2 longer setae and 6-8 shorter setae on inner margin; carpus 1.6 times longer than merus, with 5 longer and a few of shorter setae; propodus a little longer than carpus, with 7 long setae on inner margin.

Pereopod 6 (Fig.17F): basis 3.3 times as long as wide, with 7-10 setae on inner margin; ischium two-thirds as long as basis, with 8-10 setae on inner margin; merus 0.7 times as long as ischium, with 11-12 setae on inner margin; carpus as long as ischium, with 7-8 setae on inner margin; propodus as long as ischium, with 6 setae on inner margin and 10 setae on outer margin; dactylus with a dactylar seta.

Pereopod 7 (Fig.17G): basis 3.0 times as long as wide, with 11-12 setae on both margins; ischium half-length of basis, with 9-11 setae on inner margin; merus 0.55 times as long as ischium, with 7-8 setae on inner margin; carpus 1.2 times as long as merus, with 4-5 long setae on inner margin and 12-14 setae on outer margin; propodus a little longer than carpus, with 7-8 setae including a bifurcated one on inner margin and 7-8 short setae on outer margin; dactylus with a dactylar seta.

Penes (Fig.16L) slender, 7.5 times as long as wide.

Pleopod 1 (Fig.16L) peduncle short; endopod tapering toward the tip and with 36-37 denticles near the tip; exopod trapezoid, 2.4 times as wide as long.

Pleopod 2 (Fig.16N): peduncle short; endopod as long as exopod, tapering towards the tip; exopod right-angled triangular, with a rectangular concavity on outer margin; outer margin with a shallow concavity.

Pleopod 3 (Fig.16P): endopod triangular; exopod triangular, with 2 setae on outer margin.

Pleopod 4 (Fig.16Q): exopod with 4 setae on outer margin.

Pleopod 5 (Fig.16R): exopod rectangular, with a transverse rows of pectinated scales caudally.

Uropod (Fig.16S): peduncle squash triangular; endopod narrow, 3.7 times as long as wide; exopod small.

Female, except of sexual characters, has narrower setae on merus, carpus and propodus of pereopods 1-3. Pleopod 1 (Fig.16N) rectangular; Pleopod 2 (Fig.16) rectangular and slightly protruded in inner distal area.

Etymology: “*pachy*” means “broad” in Latin, “*setifer*” means “having seta”, in Latin. The present new species bears characteristic robust setae on merus, carpus and propodus of pereopods 1-3.

*Remarks*: The present new species is closely allied to *Spherillo elegans* (Nunomura, 1987), but the former is separated from the latter in the following features: (1) having robust and long setae on inner margin of merus, carpus and propodus of pereopods 1-4, (2) elliptical exopod of male first pleopod, (3) numerous aesthetascs of antennule, (4) numerous denticles of the distal part of male first pleopod, (5) blackish color pattern and (6) shorter endopod of male second pleopod.

***Spherillo ishidai* Nunomura, 2011**  
**(Japanese name: Ishida-koshihiro-dangomushi)**  
**(Fig.18)**

*Spherillo ishidai* Nunomura, 2011, p.67, figs.1-2, Nishi-iwashiro, Minabe, Wakayama.

*Material examined*: 7♂♂ (5.8-7.1 mm in body length and 8♀♀ (5.6-7.1 mm in body length), *Celtis sinensis* var. *japonica*, *Daphniphyllum reuhsmani* and *Shiia* forest. Sunokawa-Park, Sunokawa, Ainan-cho, 3, June 2012, coll. Noboru Nunomura.

*Description of male*: Body (Fig.18A) 2.1 times as long as wide, Color blackish brown with a pair of longitudinal paler patterns on both margin of pereonal somite. Cephalon rectangular in dorsal view. Anterior margin of

cephalon straight. Posterior margin of pleotelson (Fig.18B) hour-grass-shaped, lateral depression shallow.

Antennule (Fig.18C) three-segmented; terminal segments with 5-6 aesthetascs near the tip, tip acute. Antenna (Fig.18D): fifth peduncular segment, with a long seta at distal angle: second flagellar segment 2.8 times longer than the first.

Pereopod 1 (Fig.18E and F): basis with 12-13 setae on inner margin and 8 setae on outer margin; ischium half-length of basis; merus 0.6 times as long as ischium, with many stout setae on inner margin and 5 setae at outer distal area; carpus as long as merus, with a cleaning brush on frontal surface and many setae on inner margin; propodus with about 10 shorter setae on basal half and 4 longer and trifurcated setae on distal half of inner margin and 8 setae on outer margin; dactylus with a dactylar seta.

Pereopod 2 (Fig.18G): basis with 8-9 setae on both margins; ischium half-length of basis, with 7-8 setae on



Fig.18 *Spherillo ishidai* Nunomura, 2011

A, Body (dorsal view); B, Posterior part of Pleon and pleotelson (dorsal view) C, Antennule; D, Antenna; E, Pereopod 1; F, Carpus of the same; G, Pereopod 2; H, Male pleopod 1; I, Female pleopod 1; J, Male pleopod 2; K, Female pleopod 2; L, Pleopod 3; M, Pleopod 4; N, Pleopod 5, (A-H, J, and L-N: male from Ainan, I and K: female of the same).

inner margin, 2 setae on sternal margin; merus 0.55 times as long as ischium, with 8-10 setae including trifurcated ones on inner margin; carpus 1.8 times longer than merus, with 8-11 stout setae including trifurcated ones on inner margin; propodus as long as carpus, with about 11-12 setae of inner margin; dactylus with a dactylar seta with a dactylar seta.

Penes (Fig.18H) slender, 5.6 times as long as wide.

Pleopod 1 (Fig.18H): endopod tapering toward the and with more than 33 denticles near the tip; exopod elliptical, with a small concavity.

Pleopod 2 (Fig.18J) peduncle short; endopod tapering towards the tip and exceeding the tip of exopod; exopod right-angled triangular, with a rectangular concavity on outer margin; outer margin with a shallow concavity.

Pleopod 3 (Fig.18L): peduncle relatively narrow, with a seta; endopod triangular; exopod triangular, with 3-4 setae on outer margin.

Pleopod 4 (Fig.18M): peduncle relatively narrow; endopod wrinkled triangular; exopod elliptical, with 7 setae on outer margin.

Pleopod 5 (Fig.18N): exopod with of scattered pectinated scales caudally.

Female: Except of sexual characters, female is similar to male. Pleopod 1 (Fig.18I) rectangular, with 4 setae. Pleopod 2 (Fig.18K) trapezoidal, with 4 setae.

*Remarks:* These specimens agree with the original description of *Spherillo ishidai* Nunomura, 2011, reported from the shore of Minabe, Kii Peninsula (Wakayama Prefecture), but the following differences are recognized: (1) irregular color paler patterns on dorsal surface of pereonal somites, (2) widely spread pectinated pleopod 5, (3) narrower area of for cleaning brush on frontal surface of carpus of pereopod 1 and (4) having sinuate endopod of outer margin of male first pleopod.

### ***Spherillo russoi* (Arcangeli, 1927)**

**(Japanese name: Tatejima-koshibiro-danngomushi)**

*Armadillo russoi* Arcangeli, 1927, p. 218, fig. 3.

*Material examined:* 1♀, Iekushi, Ainain-cho, 3, June 2012, coll. Noboru Nunomura; 8♀♀, Michou-jinja, Uchiko-cho, 14, Oct. 1995, coll. Eiji Yamamoto; 1♂3♀♀, Tabe, Iyo-gun, coll. Kazuo Ishikawa; 1♀, Joju, Mt. Ishizuchi, 8, June 1969, coll. Kazuo Ishikawa; 5♀♀, Heikedani, Yawatahama-shi, 15, Apr. 1980, coll. Eiji Yamamoto; 1♀, Rakando, Cave, 11, Oct. 1990, coll. Shuhei Nomura; 1♀, Mozugatoge Pass (alt. 480m), *Cryptomeria japonica* forest, Matsuyama-shi, 25, Nov. 2010, coll. Nobuo Tsurusaki; 3♀♀, Mt. Takanawa, *Fagus crenata* forest litter, Matsuyama-shi, 22, Mar. 2011, Nobuo Tsurusaki; 2♀♀, Kutsunajima Hachimangu, Oura, Is. Nakajima, Matsuyama-shi, 9, July, 2009, coll. Nobuo Tsurusaki; 6♀♀, Hoketsuananogozen, Yoshida-machi, Yoshiaki Nishikawa.

### Porcellionidae

### ***Porcellio scaber* Latreille, 1804**

**(Japanese name: Warajimushi)**

*Porcellio scaber* Latreille, 1804, p. 45.

*Material examined:* 1♀, Namitsumanohana, Ooura, Matsuyama-shi, 9, Apr. 2012, coll. Noboru Nunomura; 6♂♂12♀♀, Ohsuminohana, Namikawta-cho, Takahama-cho, Matsuyama-shi, 23, Sep. 2012, coll. Kizo Ishikawa; 5exs; Nakajimacho, Oct. 1991, coll. Noboru Nunomura (TOYA Cr-14278~14282); 2exs, Tsuchigoya, Omogo-mura, May 1992, coll. Hisao Nambu (TOYA Cr-14283~14284).

### ***Porcellionides pruinosus* (Brandt, 1833)**

**(Japanese name: Hoso-warajimushi)**

*Porcellio pruinosus* Brandt, 1833, p. 181.

*Porcellionides pruinosus*, Sars, 1898.

*Material examined:* 1♂4♀♀, Nezumi-jima, Maajiro, Yawatahama-shi, 8, Apr. 2012, coll. Noboru Nunomura;

2♂♂, Takata, Uwajima-shi, 3, June 2012, coll. Noboru Nunomura; 2♀♀, Futami, Ikata-cho, 9, Apr. 2012, coll. Noboru Nunomura; 7♀♀, Shiroishi-nohana, Takahama-cho, Matsuyama-shi, 23, Sep. 2012, coll. Kazuo Ishikawa; 2♂♂, Takata, Uwajima-shi, 3, June 2012, coll. Noboru Nunomura; 1♂8♀♀, Sea-side Park, Futami-cho, Iyo-shi, 9, Apr. 2012, coll. Noboru Nunomura; 1♂3♀♀, Oda-machi, 12, May, 1996, coll. Eiji Yamamoto; 10♂♂12♀♀, Hojo-Kashima, Matsuyama-shi, 7, Feb. 2013, coll. Kazuo Ishikawa; 1♂1♀, Hakatacho-takeda, Imabari-shi, 16, Apr. 2012, coll. Toshiki Mohri; 2♂♂6♀♀, Garanyama, Misaki, Misaki-cho, Mar 1975, coll. Kojiro Katsura, (TOYA Cr 6250-6257); 8exs, Kashima, Hojo-shi, 6, Oct. 1992, coll. Noboru Nunomura (TOYA Cr.11291-11298); 1♀, Yokosima, Nakajima, Matsuyama-shi, 22, Feb. 2013, coll. Keizou Akiyama; 1♂3♀♀, Matsuyama-kankou-Port, 8, Oct. 1991, coll. Noboru Nunomura.

Family Armadillidiidae  
***Armadillidium vulgare* (Latreille, 1804)**  
**(Japanese name: Oka-dangomushi)**

*Armadillo vulgaris*, Latreille, 1804, p. 48.

*Armadillidium vulgare* (Latreille), Budde-Lund, 1885, p. 66.

**Material examined:** 3♂♂4♀♀, Kobayashi, Doi-cho, Shikokuchuo-shi, 17, July 2012, coll. Kazuo Ishikawa; 1♂, Sakurai, Imabari-shi, 10, Apr. 2012, coll. Noboru Nunomura; 1♀, Kobashi, Iwagi-jima, Kamijima-cho, date unknown, coll. Kazuo Ishikawa; 3♂♂1♀, Takaishi, Matsuyama-shi, coll. Noboru Nunomura; 1♂1♀, Ueno, Matsuyama-shi, 31, Oct. 2011, coll. Kazuo Ishikawa; 2♀♀, Shiroyama, Matsuyama-shi, 16, Aug. 2008, coll. Eiji Yamamoto; 4♂♂13♀♀, Shiroishinohana, Takahama-cho, Matsuyama-shi, 23, Sep. 2012, coll. Kazuo Ishikawa; 2♀♀, Kuroiwa, Baishinji-cho, Matsuyama-shi, 25, Sep. 2012, coll. Kazuo Ishikawa; 2♂♂2♀♀, Ohsuminohana, Namikawata-cho, Takahama-cho, Matsuyama-shi, 3, Sep. 2012, coll. Kazuo Ishikawa; 1♀, Kuroiwa, Baishinji-cho, Matsuyama-shi, 4, Nov. 2011, coll. Kazuo Ishikawa; 7♂♂2♀♀, Sea-side Park, Futami-cho, Iyo-shi, 9, Apr. 2012, coll. Noboru Nunomura; 1♀, Kushi, Futami-cho, Iyo-shi, 2, June, 2012, coll. Noboru Nunomura; 2exs, Misaki-cho, Garan, 7, Mar. 1975, coll. Kojiro Katsura; 4exs, Asahigaoka, 10, May 2008, coll. Eiji Yamamoto; 2♂♂2♀♀, Nosakajinja, Shono, Misaki-cho, 9, Apr. 2012, coll. Noboru Nunomura; 4♂♂2♀♀, Nezumi-jima, Maajiro, Yawatahama-shi, 8, Apr. 2012, coll. Noboru Nunomura; 1♀, Suzakikan'non, Sanbe-machi, Seiyo-shi, 8, Apr. 2012, coll. Noboru Nunomura; 2♂♂1♀, Shirokawa-cho, Seiyo-shi, 7, June 2012, coll. Kazuo Ishikawa; 1♂1♀, Komobuchi, Uwajima-shi, 7, Apr. 2012, coll. Noboru Nunomura; 3♂♂1♀, Shitaba, Uwajima-shi, 7, Apr. 2012, coll. Noboru Nunomura; 2♂♂4♀♀, Yusu, Uwajima-shi, 7, Apr. 2012, coll. Noboru Nunomura; 1♂1♀, Takata, Uwajima-shi, 3, June 2012, coll. Noboru Nunomura; 2♀♀, Kamimatsuba, Seiyo-shi, 3, June 2012, coll. Noboru Nunomura; 2♀♀, Sunokawa, Ainan-cho, 3, June 2012, coll. Noboru Nunomura; 1♂, bamboo-forest, downstream of Shigenobu-gawa, Kitagawara, Masaki-cho, Iyo-shi, Apr. 2004, coll. Eiji Yamamoto; 4♀♀, Asahigaoka, Matsuyama-shi, 16, May 2008, coll. Eiji Yamamoto; 26♂♂1♀, Oda-cho, 12, May 1996, coll. Eiji Yamamoto; 1♂3♀♀, Odamiyama, 6, Sep. 1997, coll. Eiji Yamamoto; 1♀, Nenbutsuyama, Miyakuobo-cho, Imabari-shi, coll. Toshiki Mohri; 4♂♂8♀♀, Setogi, Nakajima-cho, 6, Oct. 1991, coll. Noboru Nunomura; 1♂, Mt. Sekizen, Iwaki, Kamijima-cho, Is. Iwaki, 14, May 2011, coll. Haruko Ishikawa; 1♂, Kutsunajima Hachimangu, Oura, Is. Nakajima, Matsuyama-shi, 9, July 2009, coll. Nobuo Tsurusaki.

Family Tylidae  
***Tylos granuriferus* Budde-Lund, 1885**  
**(Japanese name: Hama-dangomushi)**

*Tylos granulatus* (nec Krauss, 1843), Miers, 1877, p. 674, pl. 69, fig. 2.

**Material examined:** 1♀, Dozaki, Uwajima-shi, 8, Apr. 2012, coll. Noboru Nunomura; 2♀♀, Kuroiwa, Baishinji-cho, Matsuyama-shi, 25, Sep. 2012, coll. Kazuo Ishikawa; 3exs, Setogi, Nakajima-cho, 6, Oct. 1991 (TOYA Cr-11097~11099).

**Suborder Asellota**

**Family Asellidae**

***Asellus* (*Asellus*) *hilgendorfi* Bovallius, 1886**

**(Japanese name: Mizumushi)**

*Asellus hilgendorfi* Bovallius, 1886, p. 13.

*Material examined*: 7♂♂6♀♀, small stream, Kami-matsuba, Seiyo-shi, 3 June, 2012, coll. Noboru Nunomura; 2♀♀, Iwamatsu, Uwajima-shi, 21, June 2012, coll. Kazuo, Ishikawa; 3♂♂1♀, Yokoshima, Matsuyama-shi, 3, Nov. 2011, coll. Kazuo Ishikawa; 1♂4♀♀, small stream, Hirooka, Masuda, Ainan-cho, 4, June 2012, coll. Noboru Nunomura.

***Phreatoasellus kawamurai* (Tattersall, 1921)**

**(Japanese name: Naga-mizumushi)**

**(Figs.19–20)**

*Caecidotea Kawamurai* Tattersall, 1921, p. 417, pl. 15, figs. 11-18 (a well at Zeze, Otsu, Shiga Pref.).

*Asellus kawamurai*, Birstein, 1951, p. 72.

*Asellus* (*Phreatoasellus*) *kawamurai*, Matsumoto, 1962, p. 167, figs. 19, 21-27.

*Material examined*: 14♂♂ (9.5-14.8mm in Body length) and 1♀ (7.1 mm in body length), old well of Matsuyama-shi, more detailed locality, date and collector unknown.

*Description on the specimens from Matsuyama*: Body of male slender of uniform width, about 7.5 times as long as wide excluding both antennae and uropod. Body of female relatively robust, 5.3-5.5 times as long as wide. Body white in alcohol.

Antennule in male (Fig.19C), reaching the basal area of the fifth peduncular segments of antenna, composed of 3 peduncular segments and 14-15 flagellar segments. Antennule in female (Fig.19D) with 11-12 segments in. Antenna in male (Fig.19E) long, reaching almost the posterior end of pleotelson, with 5 peduncular segment and about up to 78 flagellar segments. Antennule of female (Fig.19F) much shorter than that of male, reaching the anterior part of third pereonal somite, composed of 48 segments.

Right mandible (Fig.19G): pars incisiva 3-toothed; 10 serrated setae; palp three-segmented; segment 1 with a seta at distal angle; segment 2 as long as segment 1, with a relatively stout seta on distal area; second segment with more than a dozen setae; terminal segment with more than 8 setae. Left mandible (Fig.19H): pars incisiva 3-toothed; lacinia mobilis 3-toothed; 10 serrated setae. Maxillula (Fig.19I): mesial endite with 5 plumose setae; lateral endite with 13 teeth at the tip, 6 of them serrate and outer most one is only simple. Maxilla (Fig.19J): each ramus of medial endite with 14-16 setae; lateral endite with about 30 setae. Maxilliped (Fig.19K): endite with 5 coupling hooks; palp 5-segmented, segments 4-5 slender than those of pereopods 2-3; epipodite wide, trapezoid in shape.

Pereopod 1 (Fig.20A) subchelate: basis about twice as long as wide; ischium as long as basis, with 7-8 setae on distal half of inner margin and 5-6 setae including a stronger one at outer margin; merus trapezoidal, with 3-4 setae on outer distal angle; carpus short and triangular, with 9-10 setae on inner margin; propodus stout, about 5 times longer than carpus, with 4 longer and several shorter setae and about 15 setae at outer distal angle; dactylus long, with 15-16 saw-like teeth setae on inner margin and 5-7 setae on distal outer margin.

Pereopod 2 (Fig.20B): basis 3 times as long as wide, with 4-7 setae on both margins and; ischium 2.7 times as long as wide; merus a little shorter than spreading toward the distal end, with 7-8 setae on inner margin and 4 long setae at outer distal angle; carpus 1.4 times as long as merus, with 4 groups of 2-3 setae on inner margin, 2-4 setae on outer margin; propodus as long as wide, with 4-5 groups of 2-3 setae and several shorter setae on inner margin and 4-5 setae on outer margin; dactylus with a seta.

Pereopod 3 (Fig.20C): basis 2.8 times as long as wide with 3 setae of inner margin, 4-5 setae on outer margin; ischium with 3-6 setae on inner margin, 2-5 setae on outer margin and a long seta at outer distal angle; merus with 4-6 setae on inner margin and 0-2 setae and a long seta at outer distal angle; carpus 2.2 times longer than merus, with 7-13 setae on inner margin and 2-6 setae on outer margin; propodus long about 1.2



times as long as carpus, with 4-8 setae on inner margin and 5-6 seta on outer margin; dactylus with a strong seta on inner margin and 5-6 setae on outer margin.

Pereopod 4 (Fig.20D) a little shorter than pereopod 3: basis 2.3 times as long as wide, with a seta at inner distal angle and several fine setae on outer margin; ischium fusiform, 0.8 times as long as basis, with 4-6 setae on both margins; merus triangular and two- thirds as long as ischium, with 7-9 setae on inner margin and 2-3 long setae at outer distal angle; carpus 1.7 times long longer than merus, with 5-11 setae on inner margin; propodus almost as long as carpus, with 6-8 setae on inner margin; dactylus with 4-5 setae on inner margin and 3-5 setae on outer margin; dactylus with a strong seta.

Pereopod 5 : basis twice as long as wide, with about a dozen setae on inner margin, and about 7 setae on outer margin; ischium twice as long as wide; merus twice as long as wide, with 7 setae on inner margin and 2 long setae at outer distal angle; carpus 3.7 times as long as wide with about 6 setae on inner margin and 1-3 setae at outer distal angle propodus long, 9 times as long as wide, with 7-8 setae on inner margin and 6 setae on outer margin; dactylus with a seta.

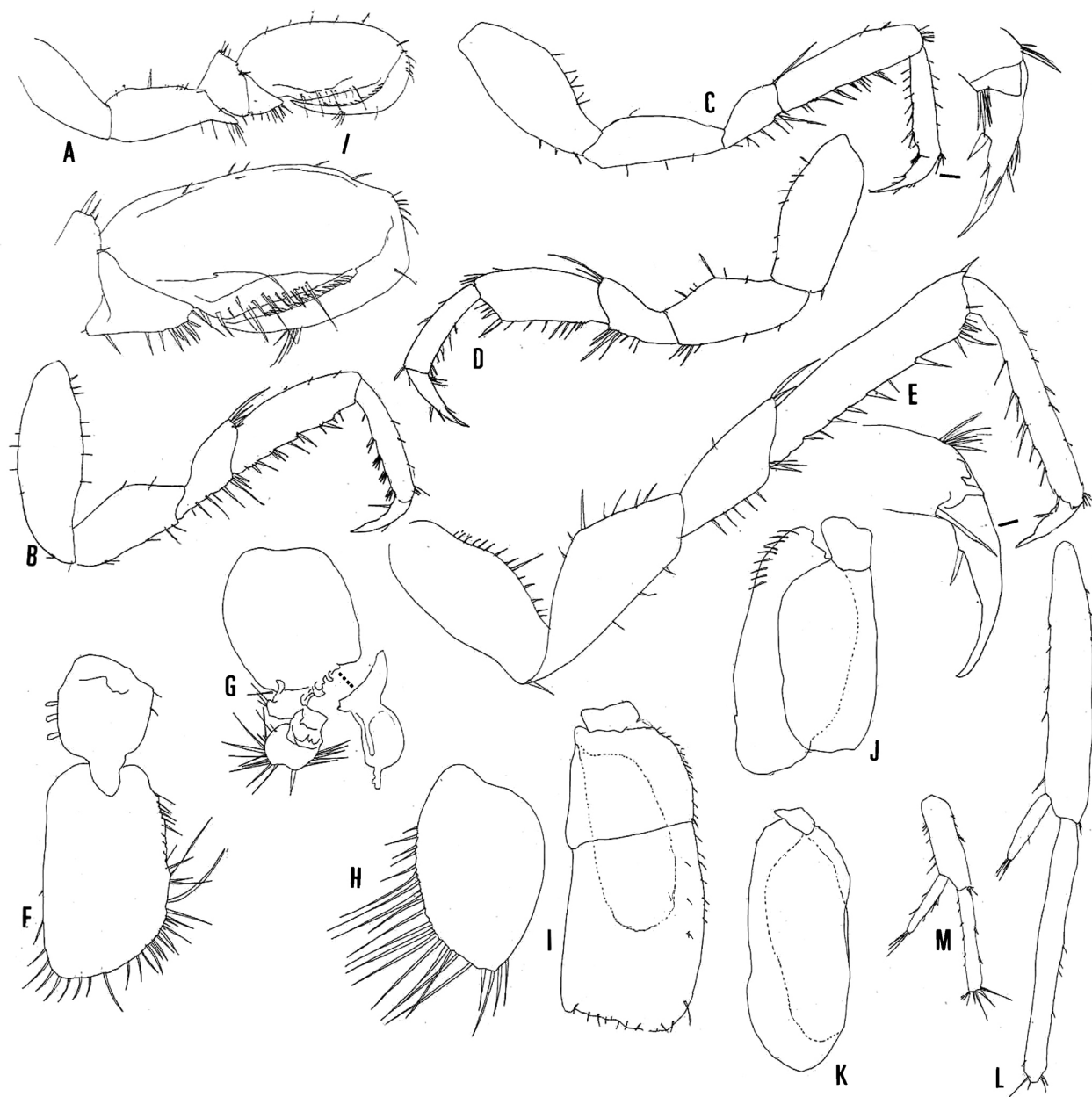


**Fig.19 *Phreatosellus kawamurai* (Tattersall, 1921)**

A, Body of male (dorsal view); B, Body of female (dorsal view); C, Antennule of male; D, Antennule of female; E, Antenna of male; F, Antenna of female; G, Right mandible; H, Left mandible; I, Maxillula; J, Maxilla; K, Maxilliped(A, C, E-K: male from Matsuyama; B and D:female from Matsuyama).

Pereopod 6 : basis with about a dozen setae on inner; ischium with 6 setae on inner margin and 8 setae on outer margin; merus with 3-6 setae on inner margin and 3 setae at outer distal angle; carpus 1.6 times longer than merus, with 9-11 setae on inner margin; propodus with 4 long setae and 3-4 setae on inner margin, 6-9 setae on outer margin; dactylus with a seta.

Pereopod 7 (Fig.20E) a little longer than the preceding ones: basis 2.3 times as long as wide, with a seta at inner distal angle and about 15 small setae on outer margin; ischium as long as basis, with 2-3 setae on inner margin and 6-7 setae on outer margin; merus 0.6 times as long as ischium, with 4-6 setae on inner margin and 2 long setae at outer distal angle; carpus twice as long as merus, and 5 times as long times, wide 11-16 setae on inner margin; propodus as long as carpus, with 8-9 setae on inner margin, 5 setae at outer distal angle, and 6-7 setae on outer margin; dactylus with a seta.



**Fig.20** *Phreatosellus kawamurai* (Tattersall,1921)

A-D, Pereopods 1-4; E, Pereopod 7; F, Pleopod 1 of male; G, Pleopod 2 in male; H, Pleopod 2 in female; I-K, Pleopods 3-5; L, Uropod of male; M, Uropod of female.(A-G, I-L: male from Matsuyama, H and M: female from Matsuyama).

Pleopod 1 of male (Fig.20F): peduncle and single ovoid exopod; peduncle 1.4 times longer than wide, 1.8 times as long as wide, inner border with 2 interlacing hooks.

Pleopod 2 of male (Fig.20G): peduncle round, a little longer than wide; endopod kidney-shaped, with a horn-shaped projection on basal area and hook-shaped projection at apical area; exopod 2-segmented, basal segment rectangular; terminal segment ovoid, with 18-20 setae around the margin. Pleopod in female (Fig.20H) round.

Pleopod 3 (Fig.20I): peduncle robust and small; endopod oval; exopod rectangular and two-segmented, terminal margin with 11-12 short setae on outer margin and more than 25 setae on outer margin.

Pleopod 4 (Fig.20J): peduncle square; endopod rectangular; exopod rectangular.

Pleopod 5 (Fig.20K): peduncle small; both rami oblong.

Uropod of male (Fig.20L) long and occupied, one-third as long as body and 1.5 times as long as pleotelson; basis occupies of uropod with 3 setae on inner margin and 5-6 setae on outer margin; endopod 40% as long as basis with a seta on both margins and at the tip; exopod. Uropod of female (Fig.20M) much shorter than that of male.

*Remarks:* This species has been reported from relatively wide area (Tattersall, 1921; Matsumoto, 1962, 1963); The present specimens from Matsuyama-shi are different from the original description from Zeze, Otsu-shi, Shiga Prefecture, in the following differences: (1) not so extremely short pereopod 4 as pereopods 3 or 5, (2) numerous setae on pereopods, (3) shorter horn-shaped projection of male pleopod 2 and (4) shorter but numerous setae on exopod of pleopod.

#### Family Janiridae

##### *Ianiropsis longiantennata* (Thielemann, 1910)

(Japanese name: Umi-mizumushi)

*Ianiropsis longiantennata* (Thielemann, 1910) p. 79, figs. 76-81 (Japan).

*Material examined:* 3♀♀, Nezumi-jimaMaajiro, Yawatahamashi, 8, Apr, 2012, coll. Noboru Nunomura; 1♂ Gelidium-bed, Handa, Misaki-cho, 5 Aug.1976, coll Kizo Nagata; 1♀, *Eisenia*-bed, Misaki-oohae, Ikata-cho, 5, Aug. 1975, coll. Kizo Nagata.

#### Suborder Cymothoida

##### Family Anthuridae

##### *Cyathura muromiensis* Nunomura, 1974

(Japanese name: Muromi-suna-uminanafushi)

*Cyathura muromiensis* Nunomura, 1974 p. 13, figs. 1-2 (about 300m from the mouth of Muromi River, Fukuoka Kyushu).

*Material examined:* 4exs, Uwajima-shi, Oct. 1, 2005, coll Hideo Suga (TOYA Cr-21259-21262) 1♀, mouth of river, Uwajima-shi, coll. Yu'ichi Miyakawa; 1♀, connection area of Kanda-river and river, Sakashizu, coll. Yu'ichi Miyakawa; 1♀, Kunomura River, Uwajima-shi, coll. Hideo Suga.

##### *Apanthuroides breviantennata* n.sp.

(Japanese name:Futohige-uminanafushi, new)

(Figs.21-22)

*Material examined:* 1♂ (holotype, 7.5mm in body length), 6, Aug. 1976, *Gelidium*-bed, Handa, Misaki-cho (Present: Ikata-cho), coll. Kizo Nagata. Holotype will be deposited at Toyama Science Museum (TOYA Cr-23521).

*Description:* Body (Fig.21A) 3 times as long as wide. Color pale slightly reddish in alcohol. Cephalon (Fig.21B) anterior margin. Eyes big, each eye composed of about 50 ommatidia. Without dorsal pit. Pleon suture line only in lateral area. Pleotelson (Fig.21C) relatively wide and round, with a pair of big statocysts.

Antennule (Fig.21D), reaching middle part of cephalon, composed of 3 peduncular segments and 10 flagellar segments, bearing much hair. Antenna (Fig.21E), reaching middle part of cephalon, composed of 5 peduncular segments and 4 flagellar segments.

Mandible (Fig.21F): palp three-segmented; segment 2 with 2 setae; terminal segment with 10 setae. Maxillula (Fig.21G) with 8 teeth. Maxilliped (Fig.21H) composed of 4 segments, terminal segment with 4 setae at the tip; epipodite round; endite not observed.

Pereopod 1 (Fig.22A) subchelate: basis stout; ischium triangular; merus rectangular, with a seta on outer distal angle; carpus narrow triangular, with 2 relatively long setae on inner margin; propodus stout, with a series of 43 setae; dactylus including unguis long reaching the distal area of carpus.

Pereopod 2 (Fig.22B) subchelate: basis rectangular, 2.5 times as long as wide, with a seta at on inner distal area ; ischium two-thirds as long as basis, with 2 setae on inner side; merus 0.4 times as long as ischium, with 2-3 setae on inner margin and a seta on outer margin; carpus triangular, with 3 setae on inner margin ; propodus rectangular, 1.6 times longer than merus, with 5-6 setae on inner margin and a stout serrated seta at inner distal angle; dactylus half-length of propodus.

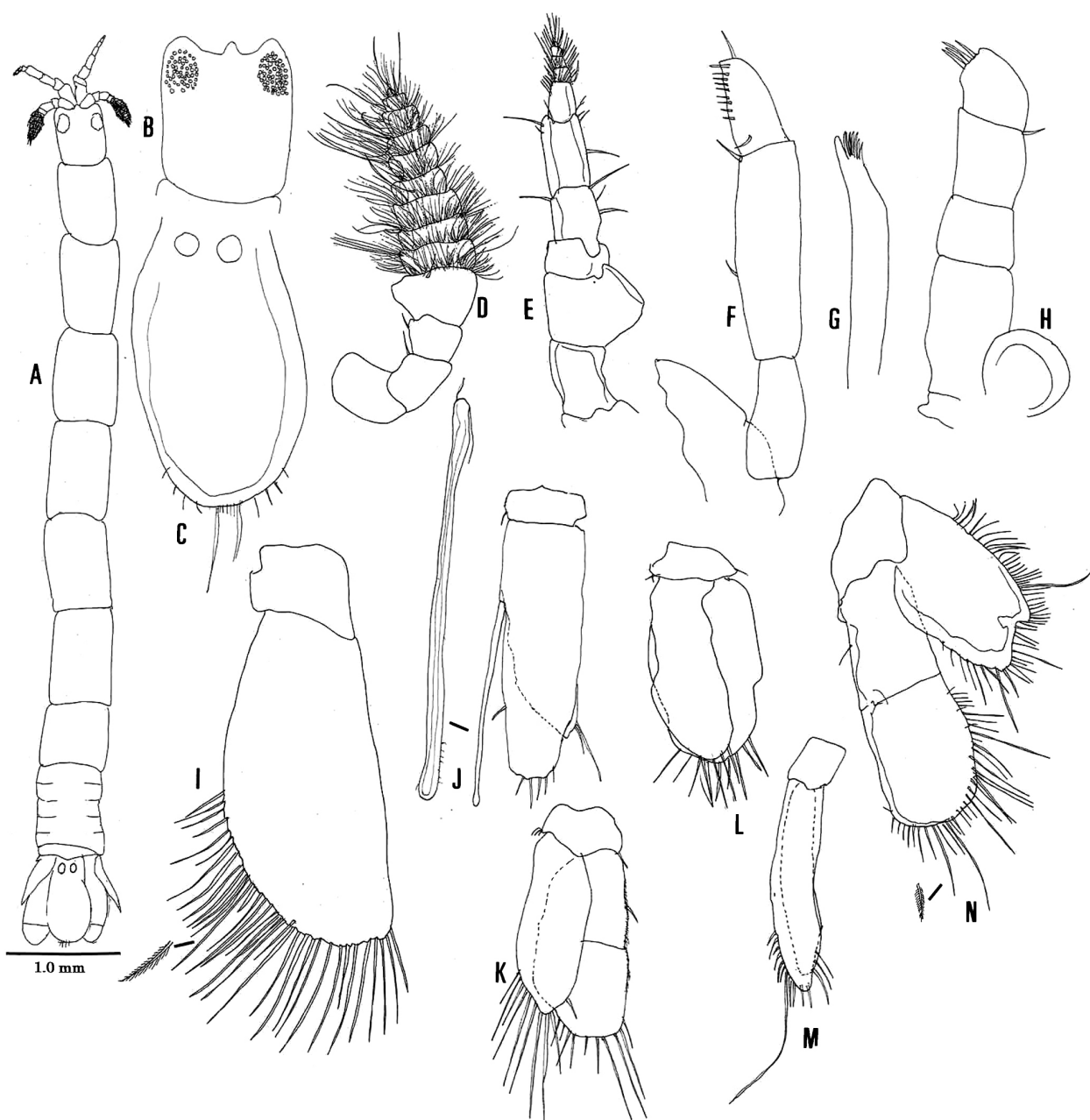


Fig.21 *Apanthuroides breviantennata* n.sp.

A, Body (dorsal view); B, Cephalon; C, Pleotelson; D, Antennule; E, Antenna; F, Mandible; G, Maxillula; H, Maxilliped; I, Pleopod 1; J, Pleopod 2 in male, K-M, Pleopods 3-5; N, Uropod, (All: holotype male).

Pereopod 3 (Fig.22C) subchelate: basis rectangular, 2.5 times as long as wide, with a seta at on inner distal area; ischium two-thirds as long as basis, with 2 setae on inner margin; merus one-thirds as long as ischium, 3 setae at inner distal angle and a seta on outer distal angle; carpus triangular, with 3 longer and several shorter setae at inner distal area ; propodus rectangular, 2.7 times longer than merus, with 2 setae and many minute setae on inner margin; dactylus half-length of propodus.

Pereopod 4 (Fig.22D): basis rectangular, 2.6 times as long as wide, with 2 relatively long setae on inner margin; ischium a little shorter than basis, with a seta at inner distal angle; merus 0.45 times as long as ischium, with 2 setae on inner margin and a seta on outer margin; carpus pentagonal and a little shorter than merus, with 4 long and a robust seta on inner margin, and 3 setae on outer distal area; propodus rectangular, 1.6 times longer than carpus, with a seta and a robust seta at inner distal angle and 2 setae at outer distal angle; dactylus half-length of propodus.

Pereopod 5 (Fig.22E): basis rectangular, 2.3 times as long as wide; ischium a little shorter than basis; merus 0.6 times as long as ischium, with 2 setae on inner margin and a seta on outer margin; carpus pentagonal, three-fourths as long as merus, with a long seta, 2-3 shorter setae and a robust spur; propodus rectangular, 2.2 times longer than carpus, with 2 setae and many short ones on inner margin and 4 setae at inner distal angle; dactylus half-length of propodus.

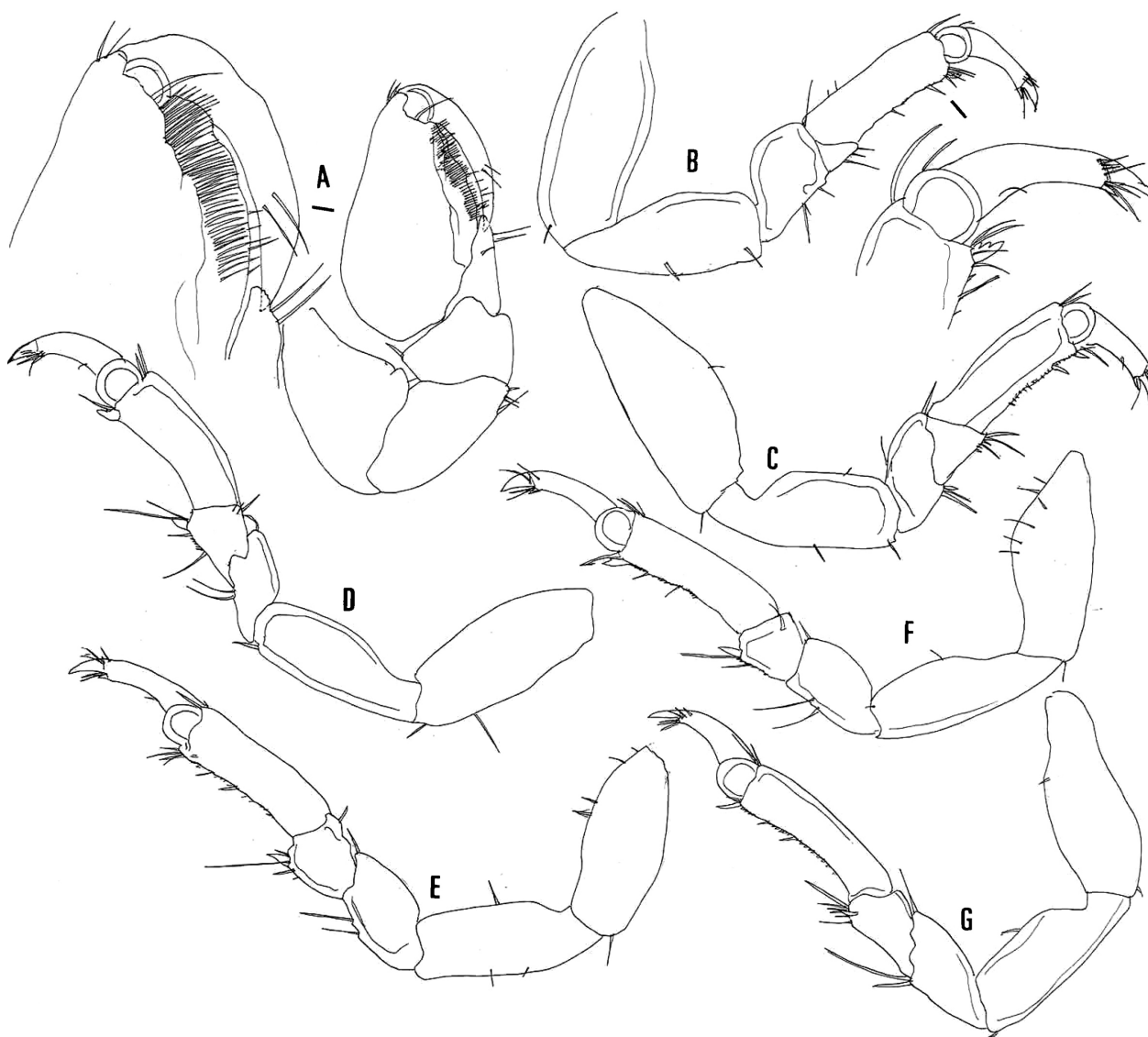


Fig.22 *Apanthuroides brevantennata* n.sp.

A-G, Pereopods 1-7 (All: holotype male).



Pereopod 6 (Fig.22F): basis, rectangular, 2.5 times as long as wide, with 6 setae on outer area; ischium 0.9 times as long as basis; merus half-length of ischium, with 2 setae on inner margin and a seta at outer distal corner; carpus pentagonal, 0.7 times as long as merus, with a long seta, 2-3 shorter setae and a robust spur; propodus 2.2 times longer than carpus, with 3 setae and many denticles on inner margin and a spine at inner distal angle; dactylus half-length of propodus.

Pereopod 7 (Fig.22G): basis rectangular, 2.4 times as long as wide; ischium a little shorter than basis; merus half-length of merus, with 2 setae on inner margin and a seta on outer margin; carpus pentagonal, as long as merus, with a long seta, 4-5 shorter setae, a robust spur and many denticles on inner margin; propodus 1.6 times longer than carpus, with 3 setae and many denticles on inner margin; dactylus less than half-length of propodus.

Pleopod 1 (Fig.21I): peduncle trapezoidal; exopod wide, with about 40 setae around the margin.

Pleopod 2 (Fig.21J): peduncle short and rectangular; appendix masculina exceeds the tip of both rami, whose tip rounded.

Pleopod 3 (Fig.21K): peduncle 0.6 times as long as wide; endopod lanceolate, with 10 setae around the margin; exopod lanceolate, with a suture line on middle area and 9-10 setae around the margin.

Pleopod 4 (Fig.21L): both rami lanceolate, with 5-6 setae around the margin.

Pleopod 5 (Fig.21M): peduncle square; both rami narrow-lanceolate, with 15-16 setae including an extremely long one.

Uropod (Fig.21N): endopod with more than 35 plumose setae around the margin; exopod rectangular with slightly sinuate margin and more than 50 plumose setae around the margin.

Etymology: “*brevus*” means “broad” in Latin and “*antennata*” This species has relatively broad antennae.

*Remarks*: The present new species belongs to the genus *Apanthuroides* (Poore and Lew Ton, 1985) in having pentagonal carpus of pereopods and round terminal palpal segment. Hitherto, 8 species of the genus *Apanthuroides* have been known as valid in the world, among them the present new species is most closely allied to *Apanthuroides millae* recorded from Puerto Rico (Menzies and Glynn, 1968; Kensley, and Schotte, 2000); but the former is separated from the latter in the following features: (1) shorter but broader antennae, (2) wider pleotelson, (3) rounded uropodal endopod, (4) stouter antennule, (5) smaller eyes, (6) peduncular carpus of posterior pereopods, (7) round epipodite of maxilliped and (8) longer body. This is the first record of the genus *Apanthuroides* in Japanese waters.

### Family Paranthuridae

#### *Paranthura kagawaensis* Nunomura, 1993

(Japanese name: Kagawa-uminanafushi)

(Fig.23)

*Paranthura kagawaensis* Nunomura, 1993, p. 24, fig. 5 (west of Noumisaki, Kagawa Pref.).

*Material examined*: 1♂ (5.8mm in body length), *Gelidium*-bed, Handa, Misaki-cho, Oct. 1977, coll. Kizo Nagata; 2♀♀, *Gelidium*-bed, Handa, Misaki-cho, 6, Aug. 1977, coll. Kizo Nagata; 1♀, *Gelidium*-bed, Handa, Misaki-cho, 12, Nov. 1977, coll. Kizo Nagata; 1♂, *Gelidium*-bed, Handa, Misaki-cho, 7, May 1977, coll. Kizo Nagata; 2♀♀, *Eisenia*-bed, Misaki-oohae, Ikata-cho, 12, Nov. 1976, coll. Kizo Nagata.

*Redescription of male collected from Misaki*: Body (Fig.23A) elongated 13 times as long as wide. Antennule (Fig.23B, D) with 3 peduncular and 8 flagellar segments. Antenna (Fig.23B F) with 5 peduncular and flagellar segments. Female with less numerous setae on antennae (Fig.23C). Eyes composed of 32-33 ommatidia, each ommatidium separated. Pereonal somites without dorsal pit. Suture lines of pleonal somite distinct. Pleotelson lanceolate, without statocysts.

Mandible (Fig.23F): mandibular palp three-segmented; second segment with 2 long setae on the distal half; terminal segment with 13-14 setae. Maxillula (Fig.23G) elongated, with 12-13 teeth. Maxilliped (Fig.23H) composed of 2 slender segments.

Pereopods 1-3 subchelate. Pereopod 1 (Fig.23I): basis fusiform, 1.7 times as long as wide; ischium three-fourths as long as basis; merus one-third as long as ischium, with a seta on inner margin; carpus triangular, 1.5 times as long as merus, with 2 setae on inner margin; propodus stout, with 9-10 setae on inner margin and a seta at outer distal angle.

Pereopod 2 (Fig.23J) slenderer than pereopod 1: basis fusiform, 3.4 times as long as wide, ischium 0.7 times as long as basis; merus half-length of ischium, with 2 setae on inner margin; carpus triangular and as long as merus, with 3 setae at inner distal angle; propodus stout, with 6 stout setae; dactyls a little shorter than propodus.

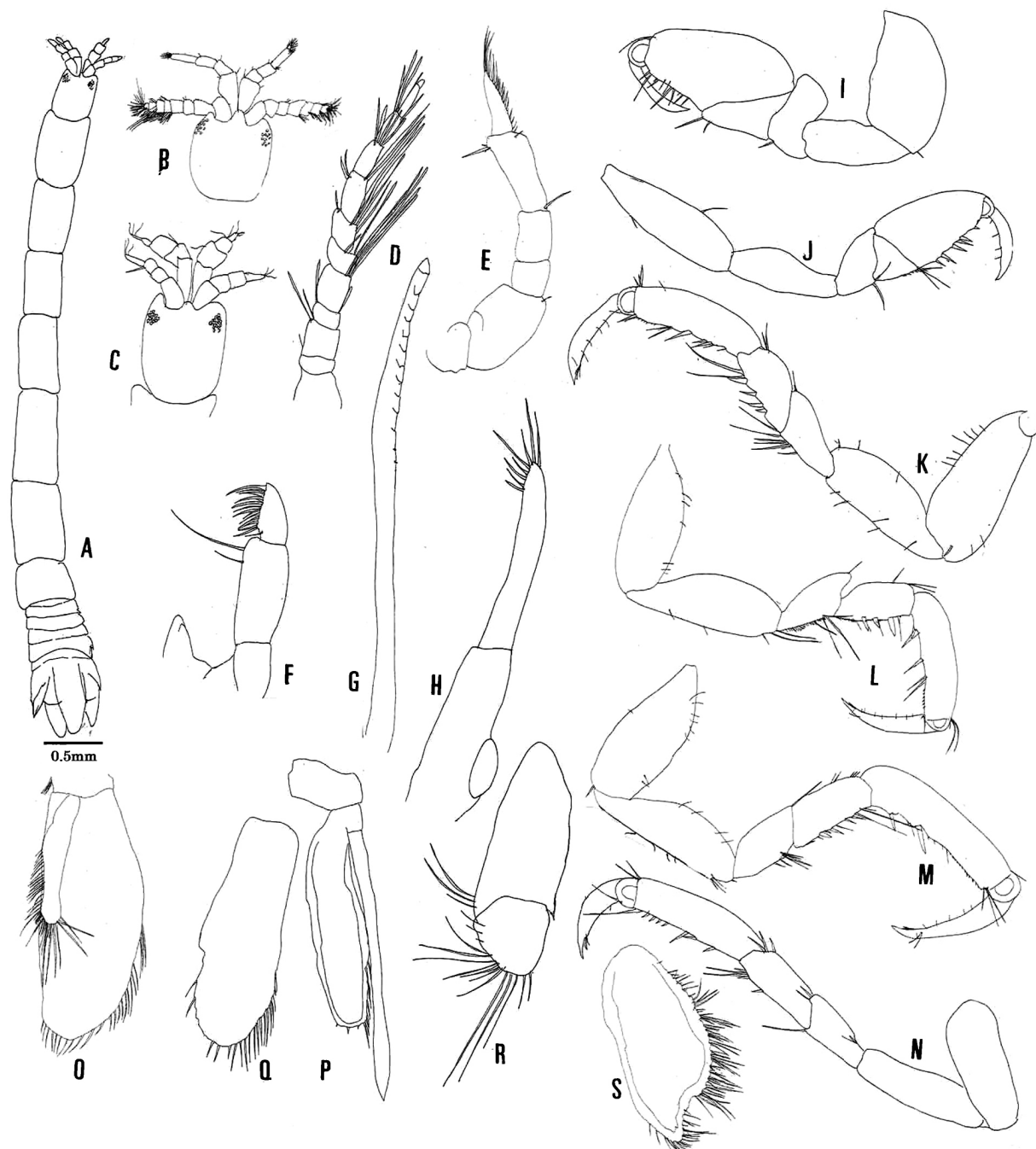


Fig. 23 *Paranthura kagawaensis* Nunomura, 1993

A, Body (dorsal view); B, Cephalon of male; C, Cephalon of female; D, Antennule; E, Antenna; F, Mandible; G, Maxillula; H, Maxilliped; I-J, Pereopods 1-2; K-N, Pereopods 4-7; O, Pleopod 1; P, Endopod and appendix masculina on male of pleopod 2; Q, exopod of the same; R, Endopod of uropod; S, Exopod of the same (A-B, D-S: male from Misaki, C: female of the same).

Pereopods 4-7 ambulatory. Pereopod 4(Fig.23K): basis fusiform, 2.2 times as long as wide; ischium a little shorter than basis; merus half-length of ischium, with 6-7 setae; carpus 1.2 times as long as merus, with 2 long setae and 4 robust setae; propodus 1.3 times as long as carpus, with 8-9 setae on inner margin.

Pereopod 5 (Fig.23L): basis fusiform, 2.7 times as long as wide; ischium as long as basis, with 3 short and 2 long setae; merus half as long as ischium, with 4 long setae and much hair on inner margin; carpus almost as long as merus, with 3 stout setae; propodus 1.7 times as long as carpus, with 5 setae and several short ones on inner margin.

Pereopod 6 (Fig.23M): basis fusiform, 2.7 times as long as wide; ischium as long as basis, with setae; merus half-length of ischium, with 6 setae on inner margin and a seta at outer distal angle; carpus 1.2 times as long as merus, with 3 stout setae and 4 slender setae on inner margin; propodus 1.7 times as long as carpus, with setae; dactylus 3 setae and several short ones.

Pereopod 7 (Fig.23N): basis fusiform, 2.6 times as long as wide, ischium as long as basis, with 4 setae and a group of 3 setae on inner margin and 4 setae on outer; merus 0.55 times as long as ischium, with 2 setae and a group of 4 setae on inner margin and a seta at outer distal angle; carpus 1.2 times as long as merus, with setae; propodus 1.5 times as long as carpus, with 9 setae including 2 longer ones and 2 setae at outer distal angle.

Pleopod 1 (Fig.23O): peduncle with 3 coupling hooks; endopod wide, 2.3 times as long as wide, with 25 plumose setae; exopod narrow, 5 times as long as wide, with 45 setae around the margin.

Pleopod 2 (Fig.23P and Q): endopod with slender appendix masculina, exceeding the tip of endopod, spearhead-shaped; exopod a little longer and wider than endopod.

Uropod: peduncle rectangular, slightly spreading toward the distal end bearing 3 setae (Fig.23R): endopod semicircular, with 13-14 setae; exopod (Fig.23S) sinuated tip, with more than 70 setae around the margin.

*Remarks:* The present specimens from Misaki show some differences from those collected from subtidal zone of west of Noumisaki, Kagawa Prefecture (Nunomura, 1993) in the following features: (1) sinuated margin of both rami of uropod, (2) numerous teeth of maxillula, (3) numerous setae on antennule, (4) numerous setae on pereopod 7. These differences are considered to be a variation within the same species.

***Colanthura setouchiensis*, Nunomura, 1993**  
**(Japanese name : Setouchi-ashitarazu-uminanafushi)**  
**(Fig.24)**

*Colantura* [*sic.*] *setouchiensis* Nunomura, 1993c, p. 27, figs. 6-7 (Kunimi-cho, Ooita Pref.).

*Material examined:* 1♂ (7.0mm in body length) and 1♀ (4.6mm in body length), *Gelidium*-bed, Handa, Misaki-cho, 7, May 1977, coll. Kizo Nagata.

*Redescription:* Body (Fig.24A) 11.5 times as long as wide in male and 10.1 times as long as wide, in female. Color reddish gray in alcohol. Dorsal pit absent. Cephalon (Fig.24B and C) 1.2 times as long as wide; anterolateral angle protruded, Medial projection exceeds more than antero-lateral projection. Mutual length of 6 pereonal somites is 4: 4: 5: 5: 4: 3. Pereonal somite extremely reduced. All the pleonal somites distinctly divided. Pleotelson (Fig.24R) lanceolate.

Antennule (Fig.24D), reaching the posterior end of cephalon, composed of 3 peduncular and 6 flagellar segments, with many aesthetascs on the distal segments. Antenna (Fig.24E), reaching the posterior end of cephalon, composed of 5 peduncular and 2 flagellar segments. Mandible (Fig.24F) simple and reduced and palp absent. Maxillula (Fig.24G) slender, times as long as wide, with 9 teeth on distal end. Maxilliped (Fig. 24 H) slender and reduced composed only a single round segment.

Pereopod 1 (Fig.24I) subchelate and robust; ischium a little shorter than basis; merus short; carpus triangular; propodus robust, with more than 35 setae on inner margin; dactylus as long as the inner margin of propodus.

Pereopods 2-3 (Fig.24J and K) subchelate: basis rectangular; ischium three-fourths as long as basis; merus and carpus triangular; propodus robust but slightly slenderer than that of pereopod 1, with 6 teeth on inner margin.

Pereopods 4-6 (Fig.24L-N) ambulatory and similar in shape: basis rectangular, about 3.7 times as long as wide, ischium a little shorter than basis; merus 0.45 times as long as ischium, spreading toward the distal end; carpus a little shorter than merus, with 3 or 4 setae on inner margin; propodus twice longer than carpus. Pereopod 7 absent.

Pleopod 1 (Fig.24O): peduncle square; endopod narrow lanceolate, with 6 setae on distal end; exopod 1 broader than endopod, with 17-18 setae around the margin.

Pleopod 2 (Fig.24P): peduncle short, both rami narrow-lanceolate; endopod three-fourths as long as exopod, with 5 setae on distal margin; appendix masculina on endopod exceeds the tip of endopod but not reaching the end of exopod; exopod with 7 setae on distal margin.

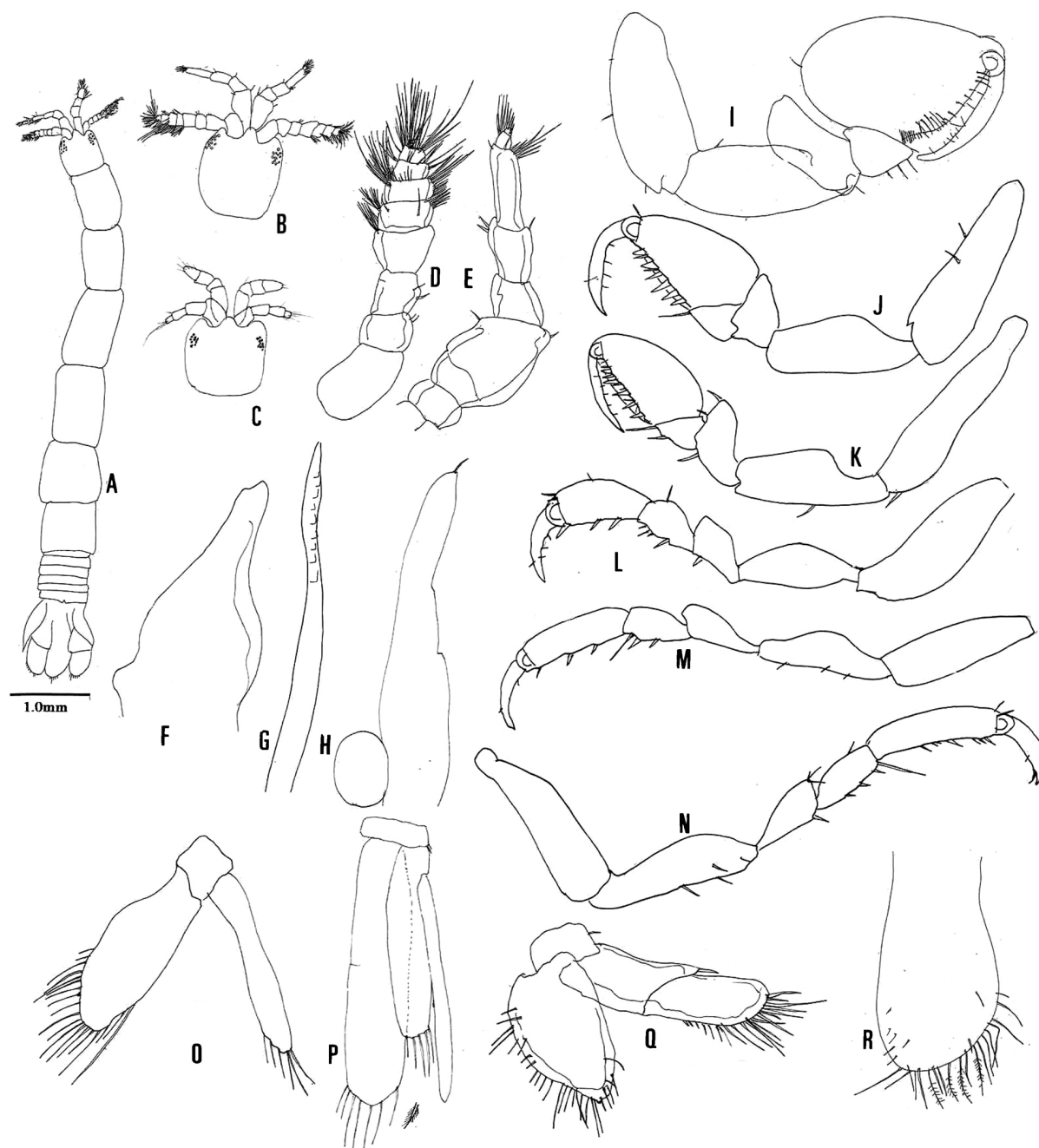


Fig.24 *Colanthura setouchiensis* Nunomura, 1993

A, Body (dorsal view); B, Cephalon of male; C, Cephalon of female; D, Antennule; E, Antenna; F, Mandible; G, Maxillula; H, Maxilliped; I-N, Pereopods 1-6; O, Pleopod 1; P, Pleopod 2 in male; Q, Uropod; R, Pleotelson (A, C-R: male from Misaki. B: female of the same).

Uropod (Fig.24Q): peduncle rectangular, with a seta at inner distal angle; endopod rounded, 1.4 times as long as wide, with about 25 setae around the margin.

*Remarks*: The present specimens agree with the original description from the sea bottom off Kagawa Prefecture (Nunomura, 1993), but shows in the following differences : (1) numerous segmentation of antenna and antenna, (2) shorter appendix masculina on male second pleopod, (3) less numerous teeth on maxillula and (4) numerous on pereopod.

**Suborder Sphaeromatidea**  
**Family Sphaeromatidae**  
*Cymodoce japonica* Richardson, 1907  
**(Japanese name: Nihon-kotsubumushi)**

*Cymodoce japonica* Richardson, 1907, p. 7, fig. 11.

*Material examined* : 1♂, Shimonami, Tsushima-cho, Uwajima-shi, 7, Apr. 2012, coll. Noboru Nunomura 4♂♂ 13♀♀, Morote, Ainan-cho, 28, Aug. 1981, coll. Shigeyuki Yamato.

***Gnorimosphaeroma hoestlandti* Kim and Kwon, 1985**  
**(Japanese name: Futage-iso-kotsubumushi)**

*Gnorimosphaeroma hoestlandti* Kim & Kwon, 1985, p. 149 (Korea).

*Material examined* : 4exs, Misho-cho, Apr. 2004, coll. Keji Wada(TOYA Cr-22553~22556).

***Gnorimosphaeroma saijoense* n.sp.**  
**(Japanese name: Saijo-kotsubumushi, new)**  
**(Figs.25-26)**

*Material examined*: 15♂♂ (1♂ holotype, 10.5 mm in body length, 14♂♂ paratypes, 7.4-9.7 mm in body length) and 19♀♀ (1♀ allotype, 8.1mm, in body length, and 18♀♀, paratypes 4.5-7.5mm in body length), Teizui-naka, in the bottom of Shiotori-gawa (small creek along the left bank of the Kamo-river) at Tesizui, Saijo-shi, 10, Apr. 2012, coll. Noboru Nunomura. Type series is deposited as follows: holotype (TOYA Cr-23469), allotype (TOYA Cr-23470) and 8 paratypes (TOYA Cr-23471~23478) at Toyama Science Museum, 8 paratypes at Ehime University Museum, 8 paratypes (OMNH Ar 9531~9538) at Osaka Museum of Natural History, 8 paratypes (4♂♂, KMNH IvR 500,670~500,673 and 4♀♀, KMNH IvR 500,674~500,677) at Kitakyushu Museum of Natural History and Human History.

*Description*: Male somewhat larger than female. Body (Fig.25A) elliptical, 1.6 times as long as wide. Color in life time dark brown. Basal segments of right and left antennules remaining separated ventrally by rostrum. Epimere of pereonal somites 1-7 well developed, quadrangular in outline. Eyes mediocre in size, each eye composed of about 45 ommatidia. Pleotelson with two long somite incisions; anterior line longer than the posterior one. Posterior margin of pleotelson rounded.

Antennule (Fig.25B) with 3 peduncular segments and 8 flagellar segments. Antenna (Fig.25C), reaching third pereonal somite, with 5 peduncular and 13 flagellar segments.

Right mandible (Fig.25D): pars incisiva 3-toothed, lacinia mobilis not chitinized with 5 teeth; processus molaris wide, palp 3-segmented; two proximal segments; second segment with 10-12 setae on inner margin; distal segment with 11-14 pectinated setae. Left mandible (Fig.25E): pars incisiva 3-toothed; processus molaris wide. Maxillula (Fig.25F and G): mesial lobe with 4 setae; lateral lobe with 10 teeth, eight of which serrate. Maxilla (Fig.25H): mesial lobe with 12 plumose setae and much hair; middle lobe of 10 setae; lateral lobe of outer ramus with 13 setae. Maxilliped (Fig.25I): palp five-segmented; endite, extending the end of palpal segment, with 6 plumose setae on distal margin and a coupling a hook on lateral margin.

Pereopod 1(Fig.26A): basis 2.4 times as long as wide, with a seta at inner distal angle; ischium 0.7 times as long as basis, with a feather-like seta and a seta at a simple seta on outer margin; merus three-fourths as long



as ischium, with much hair on inner margin and 4 setae including a long feather-shaped one on outer distal area; carpus triangular; propodus with 7 robust setae and dense hair along the inner margin; dactylus with 2 unequal claws.

Pereopod 2 (Fig.26B): basis 3 times as long as wide, with 5 setae at distal margin; ischium 0.7 times as long as basis; merus two-thirds as long as ischium, with 1-2 setae at inner distal angle and outer distal angle; carpus as long as merus, with 3-4 setae on inner distal angle and at outer distal angle; propodus a little longer than carpus and swollen on inner margin; dactylus with 2 unequal claws.

Pereopod 3 (Fig.26C): basis 4 times as long as wide; ischium two-thirds as long as basis; merus three-fourths as long as ischium, with a feather-like seta and much hair on inner margin; carpus a little longer than

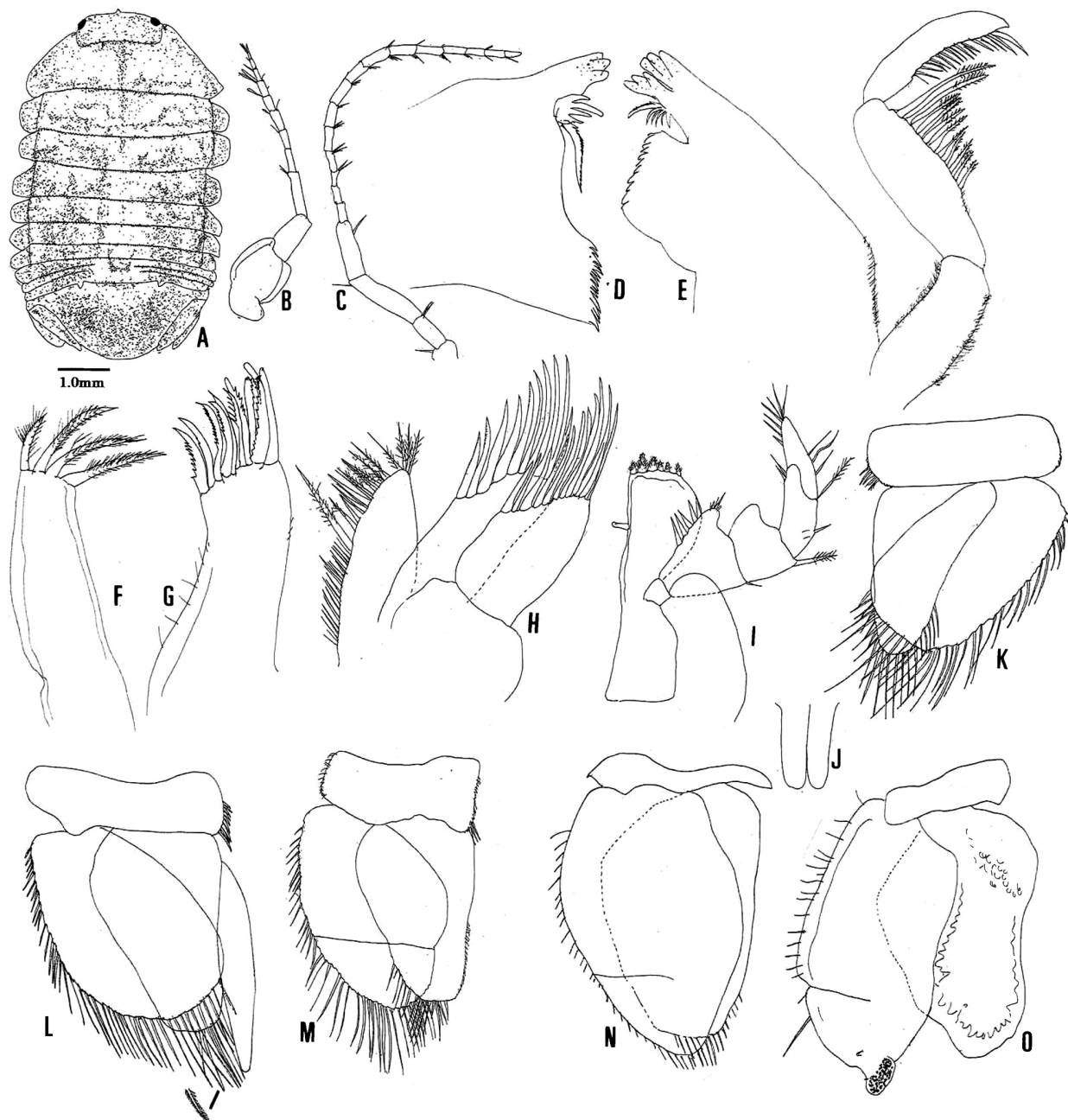


Fig.25 *Gnorimosphaeroma saijoense* n. sp.

A, Body (dorsal view), B, Antennule, C, Antenna, D, Right mandible, E, Left mandible, F, Mesial endite of maxillula; G, Lateral endite of the same; H, Maxilla; I, Maxilliped; J, Penes; K, Pleopod 1; L, Male pleopod 2; M, Pleopod 3; N, Pleopod 4; O, Pleopod 5 (All: holotype male).

merus, with much hair on inner margin; propodus a little longer than carpus, with much hair on inner margin; dactylus with 2 unequal claws.

Pereopods 4 and 5 similar in shape. Pereopod 5 (Fig.26D): basis 4.2 times as long as wide, with 4-5 short setae on inner margin and a seta at inner distal angle; ischium 0.6 times as long as basis; merus 0.6 times as long as ischium, with 3 setae at outer distal angle; carpus 0.8 times as long as merus, with 2-3 setae at inner distal angle and outer distal angle; propodus 1.5 times longer than carpus, with 4-5 setae on inner margin; dactylus with 2 unequal claws.

Pereopod 6 (Fig.26E): basis 4.3 times as long as wide, with a seta at distal angle; ischium two-thirds as long as basis; merus half-length of ischium, with 3 setae on outer distal area; carpus 1.4 times longer than merus, with a comb-like seta near the inner distal angle and 9-10 setae including 6 serrated ones around the distal margin; propodus 1.3 times longer than carpus, with 4 setae on inner margin; dactylus with 2 unequal claws.

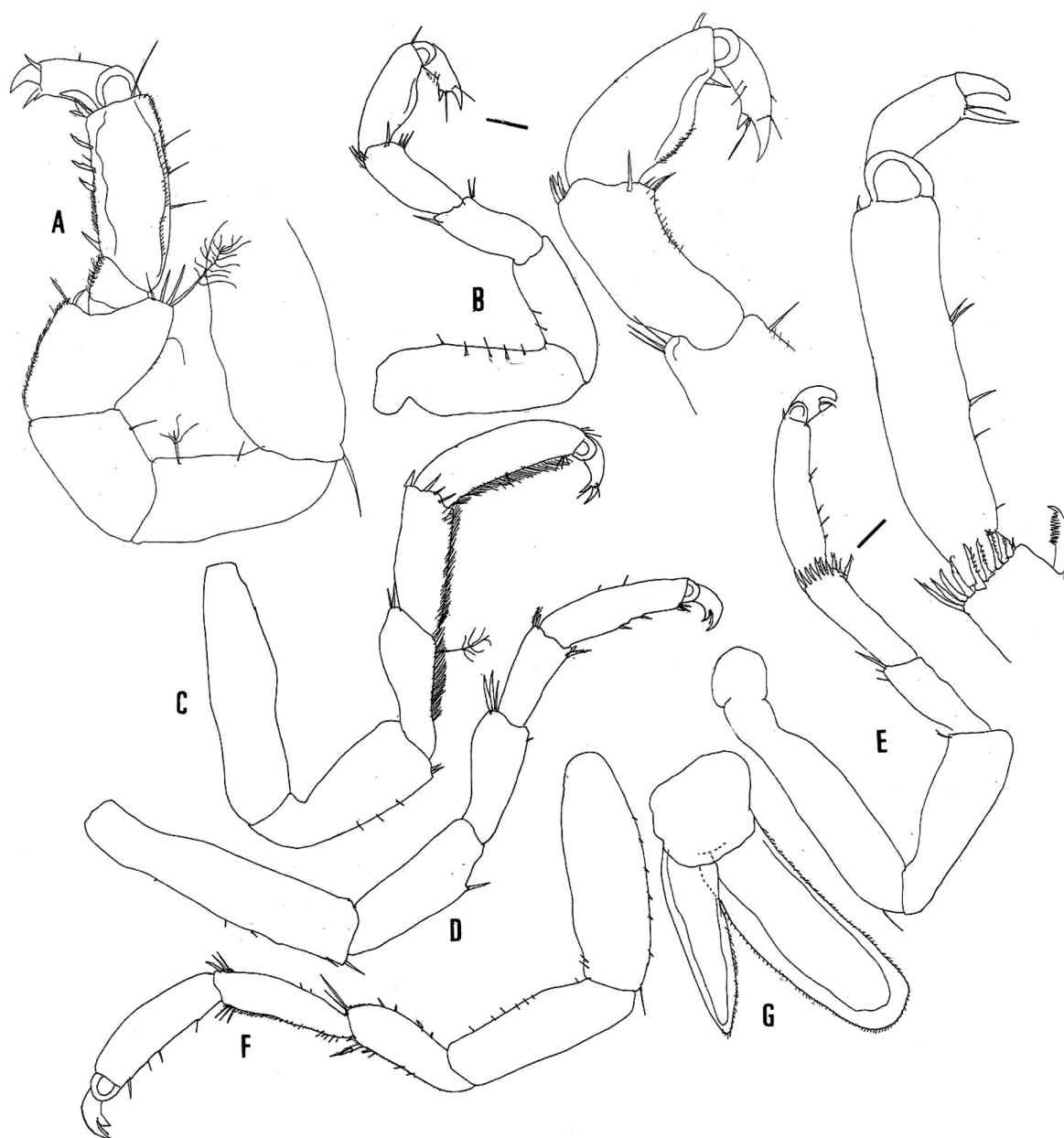


Fig. 26 *Gnorimosphaeroma saijoense* n. sp.

A-C, Pereopods 1-3, D-F, Pereopods 5-7, G, and Uropod (All: holotype male).

Pereopod 7 (Fig.26F): basis 2.9 times as long as wide, with a seta at distal angle and 6 short setae on inner margin; ischium three-fourths as long as merus, with 7 short setae on outer margin; merus 0.7 times as long as ischium, with 2 long setae at outer distal area and a relatively long seta near inner distal angle and fine hair on inner margin; carpus a little longer than merus, with 3 setae on distal area of both margins and fine hair on inner margin; propodus with 8 setae on inner margin; dactylus with 2 unequal claws.

Penes (Fig.25J) paired; each penis 3.5 times as long as wide.

Pleopod 1 (Fig.25K): peduncle with 5 coupling hooks; endopod triangular, with 17-18 plumose setae; exopod rectangular, with 38-39 plumose setae.

Pleopod 2 in male (Fig.25L): peduncle with 3-coupling hooks; endopod trapezoid, with several plumose setae around the margin; appendix masculina elongate and club-shaped, longer than endopod; exopod ellipsoidal, with more than 45 plumose setae around the margin.

Pleopod 3 (Fig.25M): peduncle with 9 coupling hooks; endopod trapezoid; exopod segmented and slightly protruded on inner margin, with about 40 plumose setae.

Pleopod 4 (Fig.25N): peduncle without coupling hooks; endopod lanceolate, with 13-15 relatively short setae around the margin; exopod partially segmented, with 33-35 setae around the margin.

Pleopod 5 (Fig.25O): peduncle without coupling hooks; endopod rectangular, with 2-3 bosses at the tip and lateral border, and a stronger and 18 weaker setae on lateral margin; exopod partially segmented.

Uropod (Fig.26G): endopod narrow-lanceolate, apical area rounded; exopod narrow-lanceolate 0.8 times as long as endopod, apical area relatively acute.

Female is similar to male, sexual dimorphism not pronounced except in size.

Etymology: This species is named after the city where the type series was collected.

Environment: The present new species was collected from the bottom of a creek named Shiotori-gawa. According to the research of Mr. Minoru Tokumasu, Saijo City, the salinity ranges was up to 3.2‰ at high tide, on 8, February 2013. Therefore, the salinity of area seems to fluctuate from 0‰ to 3.2‰. This species seems to be able to live in both freshwater and brackish environments.

*Remarks:* The present new species is most closely allied to *Gnorimosphaeroma tondaense* reported from the brackish water of Tonda River of Wakayama Prefecture (Nunomura, 1999b) in having one seta at the inner distal angle and 4 setae on outer distal area of (2) merus of first pereopod, but separated from the latter in having (1) fewer setae on maxilla, (2) longer exopod uropod, (3) single coupling hook on maxilliped and (4) less numerous setae on the second palpal segment of mandible.

The present new species is also allied to *Gnorimosphaeroma nackgtongense* reported Nacktong River of Korea (Kwon and Kim, 1981) and many freshwater systems of the Honshu facing the Sea of Japan (Nunomura 1998), in having a 4 setae at the outer distal angle of merus of pereopod 1 and only a seta at inner distal angle of basis of pereopod 1, but the former is separated from the latter in the following features: (1) presence of much-branched setae on pereopod, (2) less numerous coupling hooks on maxilliped, (3) rounded apical margin of both rami of uropod, (4) less numerous setae on mandibular palp, (5) presence of setae on pereopod and (6) stouter body.

### ***Gnorimosphaeroma paradoxa* (Nunomura, 1988)**

**(Japanese name: Kotsubushi-damashi)**

*Nishimuraia paradoxa* Nunomura, 1988 p. 2, figs. 1-2 (Uwajima City).

*Gnorimosphaeroma paradoxa* (Nunomura, 1988) Harrison and Ellis, 1991.

*Material examined:* 4♂♂1♀♀, Uwajima-shi., Uwajima Port, Benten-cho, Uwajima-shi, Mar. 1986, coll. Michio Ohtani, (TOYA Cr-7740~7743, 7745) deposited at Toyama Science Museum.

***Paracerceis suclupta* (Holmes, 1904)**

**(Japanese name: Tsuno-o-umisemi)**

*Dynamene suclupta* Holmes, 1904:296-306. (San Clemente Island, Ca. USA)

*Paracerceis suclupta* Menzies, 1962, pp.340-341.fig.2.(Baja California).

*Paracerceis japonica* Nunomura, 1988 p. 4, figs. 3-4 (Uwajima City, Ehime Pref.).

*Paracerceis suclupta* (Holmes, 1904) H. Ariyama & M. Otani (2004). Benthos Research 59 (2) : 53-59.

*Material examined* : 3♂♂1♀, Uwajima-shi, Uwajima Port, Benten-cho, Uwajima-shi, Mar. 1986, coll. Michio Ohtani, (TOYA Cr 7635~7638).

***Chitonosphaera lata* (Nishimura, 1986)**

**(Japanese name: Habahiro-kotsubumushi)**

*Gnorimosphaeroma lata* Nishimura, 1968b, p. 273, figs. 1-5 (Cape Bansho-no-Hana; sheltered hore of Seto, Shirahama, Wakayama Pref.

*Gnorimosphaeroma latum*, Nunomura & Nishimura, 1976, p. 24, fig. 3 (Nagasaki (Misaki-koen) & Koike, Misaki-cho, Osaka Pref.

*Chitonosphaeroma lata*, Kussakin, 1993, pp.1196-1999.

*Material examined* : 3exs, Mouth of Shigenobu-gawa, Matsuyama-shi, 20, Apr. 2004, coll. Keiji Wada.

***Dynoides dentisinus* Shen, 1929**

**(Japanese name: Shiriken-umisemi)**

*Dynoides dentisinus* Shen, 1929, p.65, figs. 1-23 (Pechihli Bay to Tsingto, China)

*Material examined* : 15♂♂52♀♀, Sata Fishery Port, Shono, Ikata-cho, 8, Apr. 2012, coll. Noboru Nunomura; 1♂8♀♀, Kyue-monjima, Is. Nakajima, Matsuyama-shi, 7, Oct. 1991, coll. Noboru Nunomura.

***Dynoides spinopodus* Kwon & Kim, 1986**

*Dynoides spinopodus* Kwon & Kim, 1986, p. 44, figs. 1-3 (south coast of Korea (lat. 35° 11' 20" N, long. 129° 12' 36" E)

*Material examined* : 3♂♂1♀, Nezumi-jimaMaajiro, Yawatahama-shi, 8, Apr. 2012, coll. Noboru Nunomura.

***Dynoides* sp.**

**(Figs.27-28)**

*Material examined* : 2♂♂ (3.9-5.2mm in body length) and 2♀♀ (3.7-3.8mm in body length), *Eisenia*-bed, Misaki-oohae, Ikata-cho, coll. Kizo Nagata. These specimens are deposited at Toyama Science Museum (TOYA Cr- 23566~23569).

Other specimens : 1♂1♀, Sunoka, Ainan-cho, 3 June, 2012, coll. Noboru Nunomura; 3♀♀, Iegushi, Ainan-cho, 3, June 2012, coll. Noboru Nunomura; 1♀, Futami-cho, Iyoshi, 2, June 2012, coll. Noboru Nunomura.

*Description* : Body (Fig.27A) elliptical and flat, 2.0 times as long as wide. Cephalon with a small projection at the middle part of anterior margin, epimera of pereonal somites well developed. Pleonal somite. Pleotelson, 30% as long as the total length, with simple round concavity at the tip and round protruded area on the dorsal surface.

Antennule (Fig.27B), reaching middle part of pereonal somite 1, composed of 3 peduncular segments and 8 flagellar segments. Antenna (Fig.27C), reaching middle part of pereonal somite 2, composed of 5 peduncular segments and 12-13 flagellar segments.

Mandible (Fig.27E) : pars incisiva 4 -toothed, lacinia mobilis with 4 teeth; processus molaris wide. Palp (Fig.27F) 3-segmented: two proximal segments; second segment with 2 setae on inner margin; distal segment with 12 pectinated setae. Maxillula (Fig.27G) : mesial lobe with 3 plumose setae and a projection; lateral lobe with 7 setae, two of which serrate. Maxilla (Fig.27H) : mesial lobe with 7 setae including 2 serrated ones; middle lobe of 3 teeth; lateral lobe of outer ramus with 2 setae. Maxilliped (Fig.27I) : palp five-segmented fourth and fifth segment narrower than second and third segments; segments 2-5 with many setae on inner margin; endite, extending the end of second palpal segment, with a coupling hook on lateral margin and 11 setae on distal margin; dactylus with 2 unequal claws.



Pereopod 1 (Fig.28A): basis rectangular, 2.5 times as long as wide, with a series of short setae on distal half of outer margin; ischium 85% as long as basis, with a series of short setae on distal half of outer margin; merus 0.4 times as long as ischium, with 4 setae on inner margin and a seta on outer distal area; carpus triangular, half as long as merus, with a relatively strong seta on inner distal angle; propodus 3 times longer than carpus, 3 stronger and many short setae on the inner margin; dactylus with 2 unequal claws.

Pereopod 2 (Fig.28B) slender: basis 3.2 times as long as wide, with a seta at inner margin and 3 setae on outer margin; ischium 0.9 times as long as basis, with a seta on outer margin; merus 0.4 times as long as ischium, with 2 setae on inner margin and a seta on outer margin; carpus 1.7 times longer than merus, with

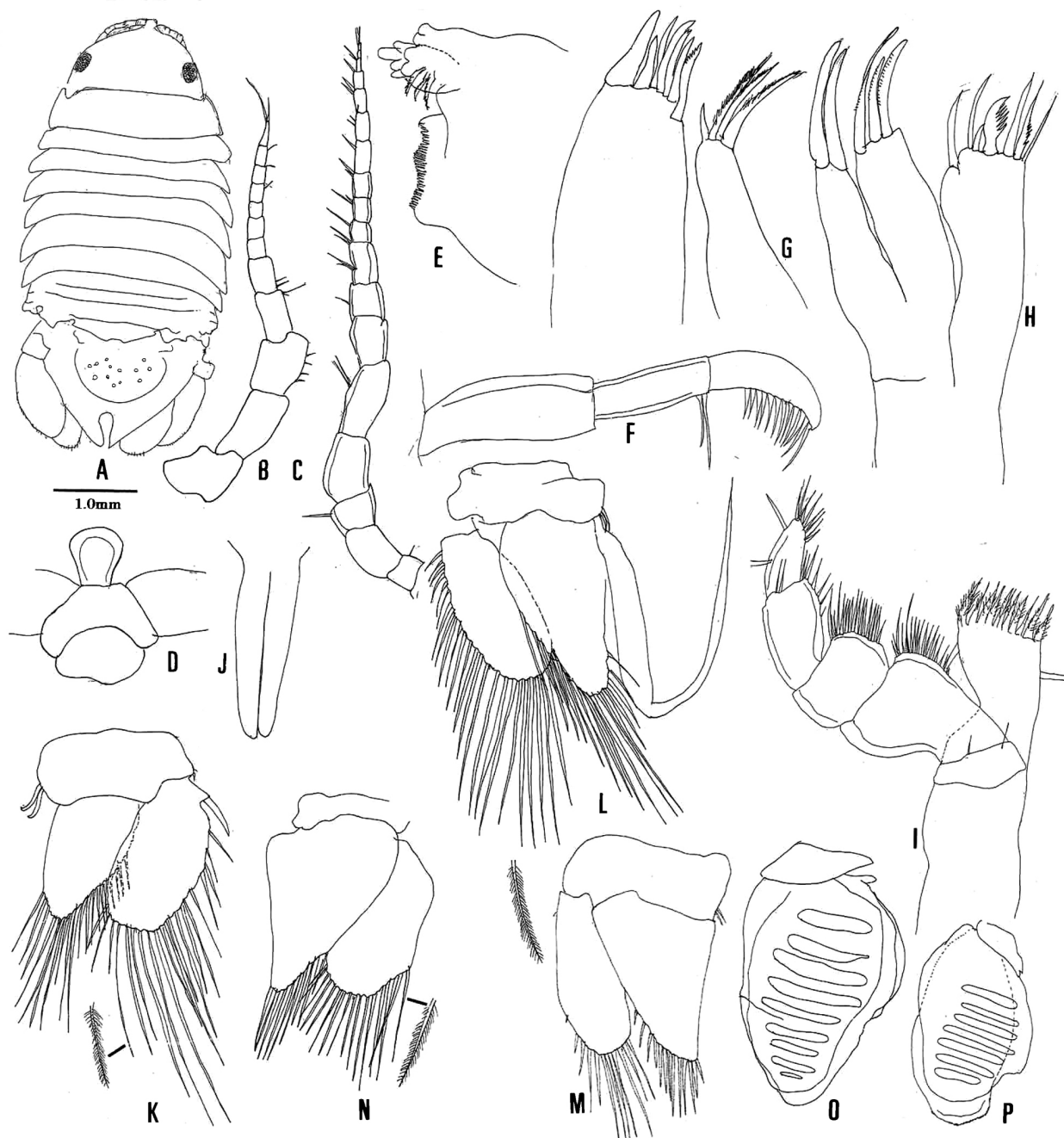


Fig.27 *Dynoides* sp.

A, Body dorsal view; B, Antennule; C, Antenna; D, Clypeus and frontal lamina; E, Mandible; F, Palp of the same; G, Maxillula; H, Maxilla; I, Maxilliped; J, Penes; K, Pleopod 1; L, Pleopod 2 in male; M, Pleopod 2 in female; N, Pleopod 3; O, Pleopod 4; P, pleopod 5; (A-L, N-P: male from Misaki, M: female of the same).



6-7 setae on inner margin; propodus a little longer than carpus, with 2 setae on both margins; dactylus with 2 unequal claws.

Pereopod 3 (Fig. 28 C) relatively robust: basis 2.3 times as long as wide, with a seta at distal angle; ischium 0.8 times as long as basis with 2 setae on distal area of both margins; merus 0.55 times as long as ischium, with a strong seta and a few of weaker setae on inner margin and 4-5 weaker setae on distal margin; carpus almost as long as propodus, with 3 setae on distal area; propodus 1.5 times longer than carpus, with 3 setae on inner margin and 2 setae on outer distal area; dactylus with 2 unequal claws.

Pereopods 4 (Fig. 28 D): basis rectangular; ischium with a seta at middle part of inner margin and a seta at distal outer angle; merus half-length of ischium, with a seta; carpus triangular; propodus rectangular, with a seta at both angle of distal angle; dactylus with 2 unequal claws.

Pereopod 5 (Fig. 28 E): basis twice as long as wide, ischium as long as basis; merus half-length of ischium, with 3 setae on inner margin and a strong setae on distal area; carpus as long as merus, with a seta on distal area of both margins; propodus 2.2 times longer than carpus, with 4-5 setae on inner margin and 3 setae on distal area on inner margin; dactylus with 2 unequal claws.

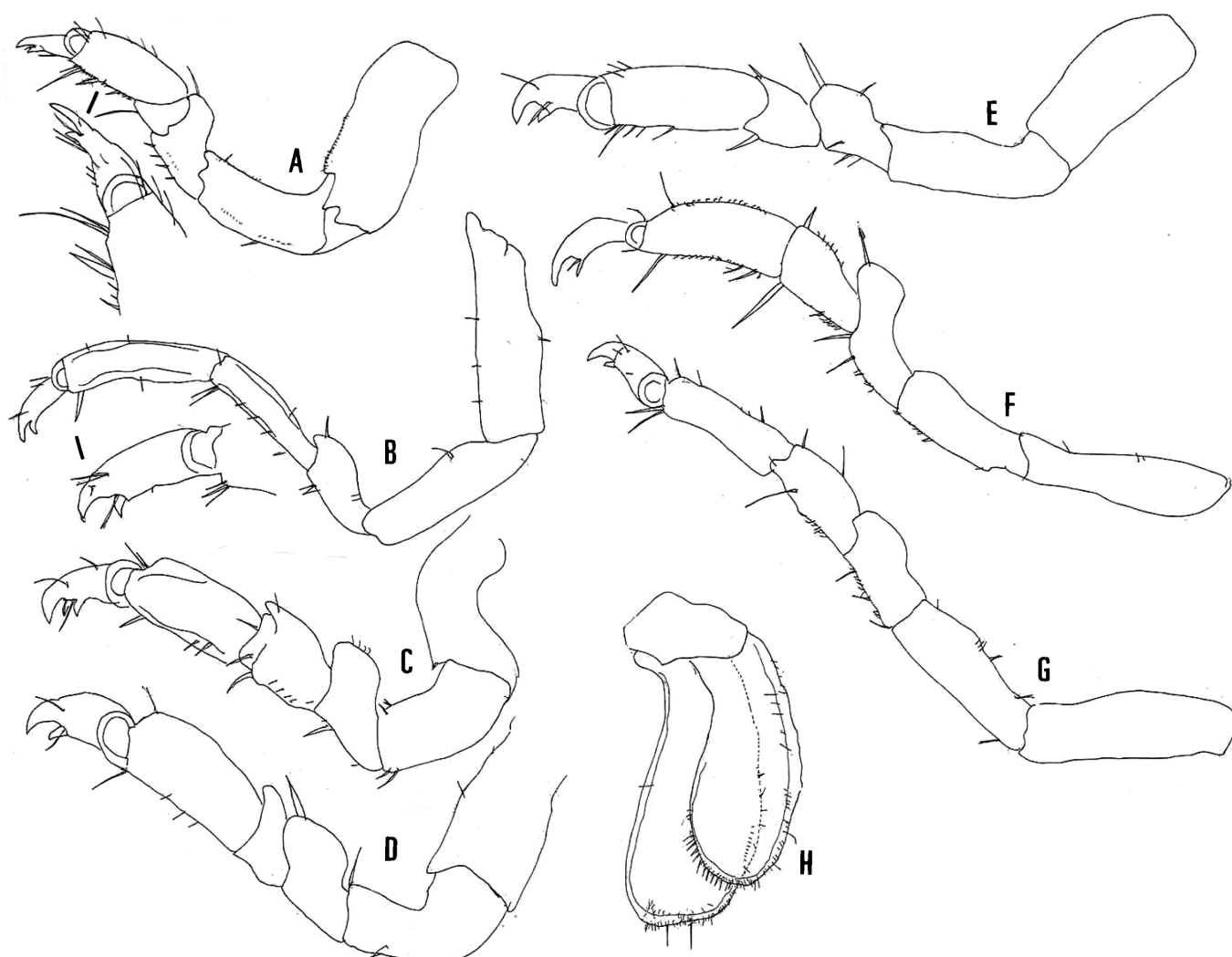


Fig. 28 *Dynoides* sp.

A, Pereopod 1; B, Pereopod 2; C, Pereopod 3; D, Pereopod 4; E, Pereopod 5; F, Pereopod 6; G, Pereopod 7; H, Uropod (All: male from Misaki).

Pereopod 6 (Fig.28F): basis 3.2 times as long as wide, with a seta at distal angle; ischium two-thirds as long as basis; merus half length; merus roundly protruded outward, half-length of ischium, with relatively long setae on inner side and a seta outer margin; carpus 1.4 times longer than merus, with a long seta at inner distal angle and as seta on distal outer angle; propodus 1.6 times longer than carpus, with 3 longer and many shorter setae on inner margin and 2 setae on distal half of outer margin; dactylus with 2 unequal claws.

Pereopod 7 (Fig.28G): basis 3.5 times as long as wide, with a seta at distal angle and 6 short seta on inner margin; ischium 0.8 times as long as merus; merus 0.6 times as long as ischium, with 3 setae on inner margin; carpus a little longer than merus, with a seta and fine hair on inner margin and 2 setae on outer margin; propodus 2.4 times longer than carpus, with 2 setae on distal area of inner margin; dactylus with 2 unequal claws.

Penes (Fig.27J) paired each penis 6.5 times as long as wide.

Pleopod 1 (Fig.27K): peduncle with 2 coupling hooks; endopod lanceolate, with about 20 setae around the margin; exopod rounded rectangular with about 19-20 setae around the margin.

Pleopod 2 in male (Fig.27L): peduncle rectangular, with 2-coupling hooks; endopod with 13-14 setae; appendix masculina elongate, and bent in middle part, longer than endopod total length 2.5 times longer than endopod ; exopod lanceolate, with 26-28 plumose setae around the margin.

Pleopod 3: (Fig.27N) peduncle without coupling hooks; both rami not segmented; endopod triangular, with 10 setae around the margin; exopod lanceolate, with about 15 plumose setae.

Pleopod 4 (Fig.27O): peduncle without coupling hooks; endopod lanceolate, with 7 fleshy folds; exopod partially segmented, without setae around the margin.

Pleopod 5 (Fig.27P): endopod rectangular, with 7 fleshy folds and a series of short setae at the tip and, without setae around the margin.

Uropod (Fig.28H): endopod lanceolate, apical area rounded; exopod lanceolate 0.85 times as long as endopod, apical area rounded.

Female is similar to male, sexual dimorphism except in size.

Pleopod 2 (Fig.27M): peduncle with 2 coupling hooks; endopod triangular, with 13 setae around the margin; exopod lanceolate, with about 12-13 plumose setae.

*Remarks*: The present specimens are similar to *Dynoides bevispina* (Bruce, 1981). But the former is separated from the latter in the following features : (1) round elevation on pleotelson, (2) smooth concavity of posterior end of pleotelson, (3) less numerous teeth on maxillula, (4) narrower both rami of uropod, (5) not protruded maxillipedal palp and (6) shorter penes.

These specimens are allied to *Dynoides artocanalis* (Nunomura, 1997) reported from the estuary of Tachbana Bay, Tokushima. But the former is separated from the latter in the following features: (1) absence of small projection on pleotelson, (2) less numerous flagella of both antennae, (3) shorter penes, (4) less numerous setae of mandibular palp, (5) less numerous setae and hair on pereopods and (6) absence of protrusion on maxillipedal palp.

Because more specimens are necessary in the classification of this group of animals, therefore, I refrained to establish a new species.

### ***Holotelson longicauda* Nunomura, 2004**

**(Japanese name: Onaga-umisemi)**

*Holotelson longicauda* Nunomura, 2004, p7-9, fig.4.

*Material examined*: 2♂♂3♀♀, Gelidium-bed, Handa, Misaki-cho, 6, Aug. 1976, coll Kizo Nagata; 1♂1♀ Gelidium-bed, Handa, Misaki-cho, 3, Nov. 1976, coll. Kizo Nagata ; 1♀, Gelidium-bed, Handa, Misaki-cho, 3, Nov. 1976, coll. Kizo Nagata ; 1♂1♀, Gelidium-bed, Handa, Misaki-cho, Oct. 1977, coll. Kizo Nagata ; 1♂, Gelidium-bed, Handa, Misaki-cho, 3, Nov. 1977, coll. Kizo Nagata.

*Holotelson clavifera* n.sp.

(Japanese name: Konbou-chibi-umisemi, new)

(Figs. 29-30)

*Material examined*: 3♂♂ (1♂ holotype, 10.3mm in body length, 2♂♂, 6.1-8.4 mm in body length), *Eisenia*-bed, Misaki-oohae, Ikata-cho, 5, Aug. 1975, coll Kizo Nagata; 4♀♀ (1♀ allotype, 4.9 mm in body length and 3♀♀ paratypes, 3.0-4.7 mm in body length), *Eisenia*-bed, Misaki-oohae, Ikata-cho, Nov. 1976, coll. Kizo Nagata. Type series is deposited as follows: holotype (TOYA Cr-23538), allotype (TOYA Cr-24539), and 2 paratypes (TOYA Cr-24540~24541) at Toyama Science Museum, Toyama, a paratype at Ehime University Museum and 2 paratypes

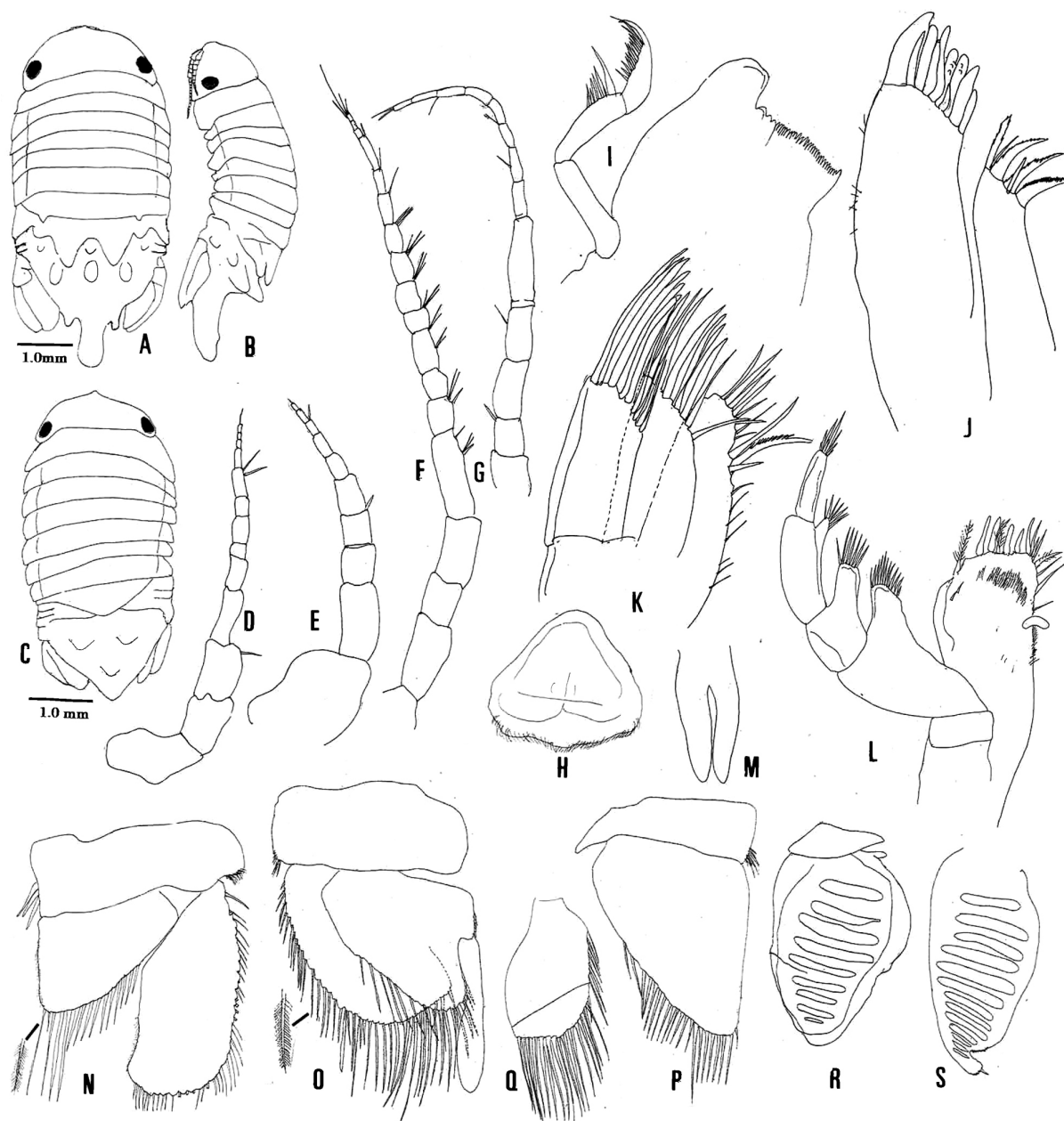


Fig. 29 *Holotelson clavifera* n.sp.

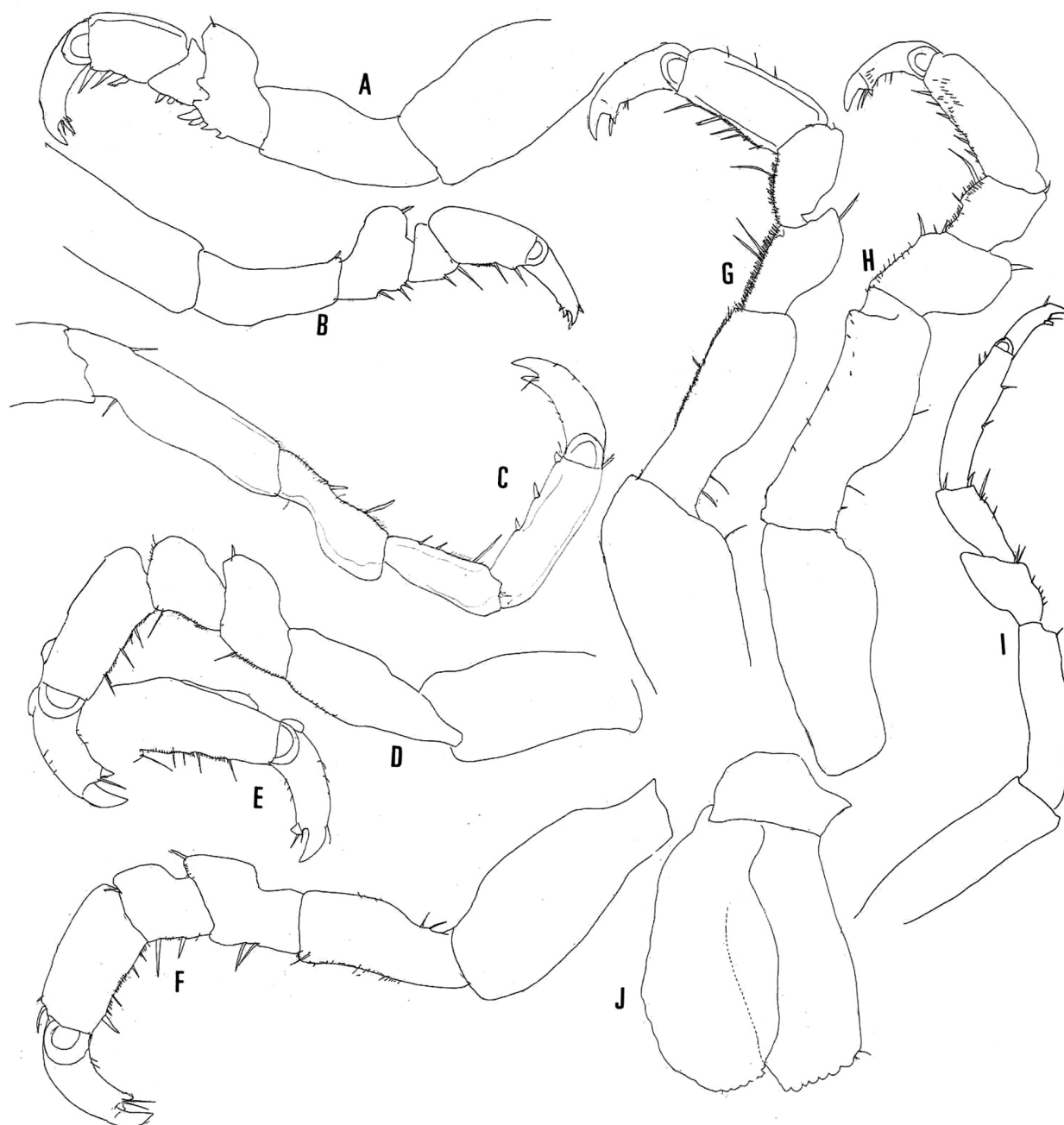
A, Body dorsal view of male; B, Lateral view of the same; C, Body of female (dorsal view); D, Antennule of male; E, Antennule of female; F, Antenna of male; G, Antenna of female; H, Upper lip; I, Mandible; J, Palp of the same; K, Maxillula; L, Maxilla; M, Maxilliped; N, Penes; O, Pleopod 1; P, Endopod of pleopod 3; Q, Exopod of the same; R, Pleopod 4; S, Pleopod 5 (A-B, D, F, H-S: holotype male, C, E, G, allotype female).

(1♂, KMNH IvR 500,680 and 1♀, KMNH IvR 500,681), at Kitakyushu Museum of Natural History and Human History, Kitakyushu.

*Description of male:* Body (Fig.29A and B) 2.2 times as long as wide. Color white in alcohol. Pereonal somites 1-6 similar in length; epimera of pereonal somite visible on dorsal view; pereonal somite 7 with a pair of small tubercles posteriorly. Pleon with a pair of stronger tubercles along the mid-line and weaker ones located outside of those. Pleotelson with three ridges. Tip extending posteriorly and club-shaped.

Antennule (Fig.29D) composed of 2 peduncular segments and 9 flagellar segments.

Antenna (Fig.29F), reaching, composed of 5 peduncular segments and 11 flagellar segments.



**Fig.30** *Holotelson clavifera* n.sp.

A, Pereopod 1 in male; B, Pereopod 1 in female; C, Pereopod 2; D, Pereopod 3; E, Apical area of the same; F, Pereopod 5; G, Pereopod 6; H, Pereopod 7 in male; I, Pereopod 7 in female; J, Uropod (A, C-H, J: holotype male, B and I, allotype female).

Mandible (Fig.29I): pars incisiva single-toothed; processus molaris wide, palp 3-segmented; second segment with 6 setae on inner margin; distal segment with 13-14 pectinated setae. Maxillula (Fig.29J): mesial lobe with 4 plumose setae and 2 slender teeth; lateral lobe with 10 teeth, 3 of them serrated ones. Maxilla (Fig.29K): medial lobe with 6 setae including 2 serrated ones; middle lobe with 9 setae; lateral lobe of outer ramus with 11 setae. Maxilliped (Fig.29L): palp five-segmented; endite, extending the end of fourth palpal segment, with a coupling hook on lateral margin and 12-13 setae on distal margin and the distal area of lateral margin, some of them plumose ones.

Pereopod 1 (Fig.30A): basis about twice as long as wide; ischium a little shorter than basis; merus half-length of merus, with 4 robust setae on inner margin and 4 setae on outer distal area; carpus half-length of merus, with 4 stout setae on inner margin; triangular; propodus 3 setae on inner margin; dactylus with 2 unequal claws.

Pereopod 2 (Fig.30C) longer than the pereopod 1: basis rectangular; ischium rectangular, almost as long as basis; merus 55% as long as ischium, with 2 teeth and much hair on inner distal angle; carpus almost as long as merus, with 3 teeth and much hair on inner margin; propodus 1.3 times longer than carpus, with 3 teeth on inner margin; dactylus with 2 unequal claws.

Pereopod 3 (Fig.30D and E): basis 2.2 times as long as wide, with a seta at distal angle; ischium 0.85 times as long as basis; merus 0.4 times as long as ischium, and much hair on inner margin; carpus twice longer than merus, with a seta and much hair on inner margin; propodus with 4 setae and much hair on inner margin; dactylus with 2 unequal claws.

Pereopods 4-5 similar in shape. Pereopod 5 (Fig.30F): basis 2.3 times as long as wide; ischium 0.6 times as long as basis, with much hair on inner margin; merus 0.6 times as long as ischium, with 2 setae on inner margin and a seta at outer distal area; carpus a little shorter than merus, with 2 setae on inner margin and a seta at outer distal area; propodus twice longer than carpus, with 4-5 setae and much hair on inner margin; dactylus with 2 unequal claws.

Pereopod 6 (Fig.30G) longer than the preceding pairs: basis 2.2 times as long as wide, with a seta at distal angle; ischium with much hair on inner margin; merus half-length of ischium, with 2 setae on inner margin and a strong seta on outer distal area; carpus as long as merus, with a long seta and much hair on inner margin; propodus 1.3 times longer than carpus, with 4-5 setae and much hair on inner margin and 3 setae on outer margin; dactylus with 2 unequal claws.

Pereopod 7 (Fig.30H): basis 2.2 times as long as wide ischium a little longer than basis; merus one-third as long as ischium, with a relatively robust seta at outer distal area and a seta near the inner distal angle and fine hair on inner margin; carpus 0.8 times as long as merus, with a seta at outer distal area and a relatively long seta near the inner distal angle and fine hair on inner margin, with fine hair on inner margin; propodus twice longer than carpus, with 5 setae on inner margin including the distal plumose one; dactylus with 2 unequal claws.

Penes (Fig.29M) paired each penis 3.6 times as long as wide.

Pleopod 1 (Fig.29N): peduncle with 3 coupling hooks; endopod with 15 plumose setae; exopod rectangular, with 38-40 setae around the margin.

Pleopod 2 (Fig.29O): peduncle with 3-coupling hooks; endopod rounded triangular; appendix masculina elongate and club-shaped; exopod longer than endopod.

Pleopod 3: (Fig.29P and Q): peduncle with 3 coupling hooks; endopod triangular, with 22-23 plumose setae; exopod segmented, with 27-28 plumose setae.

Pleopod 4 (Fig.29R): peduncle without coupling hooks; endopod lanceolate without seta; exopod partially segmented, without seta.

Pleopod 5 (Fig.29S): endopod rectangular, with 2 bosses at the tip and lateral border and a seta at the tip.

Uropod (Fig.30J): endopod narrow-lanceolate, apical area rounded; exopod narrow-lanceolate times as long as endopod, apical area rounded

Female (Fig.29C) smaller than male: pereonal somite 7 without ridge, pleotelson with 3 low ridges, located triangularly, without projection protruded posteriorly; antennule (Fig.30D) with 2 peduncular and 7 flagellar



segments; antenna (Fig.30F) with 5 peduncular and 8 flagellar segments; pereopod 1 (Fig.30B) with slenderer setae as in male and pereopod 7 (Fig.30I) slenderer than that of male.

Etymology: “clavifera” means “having club”. Pleotelson of male with a club-shaped projection at the end of pleotelson.

*Remarks*: Hitherto, 3 species have been reported (Richardson, 1909; Nunomura and Ikehara, 1995; Nunomura, 2004). Among them, the present new species is most closely allied to *Holotelson longicauda* Nunomura, 1995 reported from Shimoda, Pacific side of central Japan, but the former is separated from the latter in the following features: (1) swollen, not bifurcated tip of projection of pleotelson, (2) numerous flagellar segments of both antennae, (3) longer penes, (4) numerous setae on maxilla, (5) protruded each palpal segments of maxilliped and (6) stouter appendix masculine of male second pleopod. *Holotelson longicauda* was also collected from sea near the type locality of the present species, but the new species occurred only from the *Eisenia*-bed, whereas *longicauda* occurred solely from *Gelidium*-bed.

The present new species is also allied to *Holotelson tuberculatus* Richardson, 1909, but the former is separated from the latter in the following features: (1) having a longer and club-shaped projection on posterior end of male pleotelson, (2) stronger and different-shaped of decoration on the posterior end of the last pereonal somite, (3) robust appendix masculina of male second pleopod, (4) protruded outer margin of merus of pereopods 2 and (5) less numerous flagellar segments of antenna.

#### Family Tecticeptidae

#### *Leptosphaeroma gottschei* Hilgendorf, 1885

(Japanese name: Hirata-umisemi)

*Leptosphaeroma gottschei* Hilgendorf, 1885, p. 185 (Mogi; Kyushu).

*Leptosphaeroma gottschei*, Nishimura, 1976a, p. 169, figs. 1-26 (Osaka Bay).

*Material examined*: 2♂♂6♀♀, Nezumi-jima, Maajiro, Yawahama-shi, 8, Apr. 2012, coll.Noboru Nunomura.

#### Suborder Limnoriidea

#### Family Limnoriidae

#### *Limnoria nagatai* Nunomura, 2012

(Japanese name: Nagata-kikuimushi)

*Limnoria nagatai* Nunomura, 2012. Pp80-82, Fig.2.

*Material examined*: 5exs, *Eisenia*-bed, Misaki-oohae, Ikata-cho, 12, Nov. 1976, coll. Kizo Nagata.

#### Suborder Valvifera

#### Family Idoteidae

#### *Cleantiella isopus* (Grube, 1883)

(Japanese name: Iso-heramushi)

*Cleantis isopus* Grube in Miers, 1883, p. 80, pl. 3, figs. 9-11 (Ojica, Goto I. (lat. 33° 12' 30" N, long. 129° 5' E)).

*Material examined*: 16exs. Kuheikojima, Nakajimacho, 7, Oct. 1991, coll. Noboru Nunomura (TOYA Cr 11106~11130, 22334~22344); 2♂♂1♀♀, Nami no-hana, Ooura, Matsuyama-shi, Apr. 2012, coll. Noboru Nunomura.

#### *Cleantiella strasseni* (Thielemann, 1910)

(Japanese name: Ohiraki-heramushi)

*Cleantis Strasseni* Thielemann, 1910, p. 67, figs. 73-75 (Yokohama).

*Cleantiella strasseni*, Iwasa, 1957, p. 812, fig. 2339.

*Material examined*: 2♀♀1sex-undetermined, *Gelidium*-bed, Handa, Misaki-cho, 3, Nov. 1977, coll Kizo Nagata; 1 young *Gelidium*-bed, Handa, Misaki-cho, 7, May 1977, coll. Kizo Nagata; 1♀, *Gelidium*-bed, Handa, Misaki-cho, 3, Nov. 1977, coll Kizo Nagata.

***Synidotea hikigawaensis* Nunomura, 1974**

**(Japanese name: Herikire-warajiharamushi)**

*Synidotea hikigawaensis* Nunomura, 1974, p. 9, figs. 6-7 (Hikigawa Town, Kii Peninsula)

*Material examined*: 1♂2♀♀, *Gelidium*-bed, Handa, Misaki-cho, 7, May 1977, coll. Kizo Nagata; 1♀, *Eisenia*-bed, Handa, Misaki-cho, coll. Kizo Nagata; 1♀, *Gelidium*-bed, Handa, Misaki-cho, coll. Kizo Nagata; 1ex, Handa, Misaki-cho, 3, Nov. 1977, coll. Kizo Nagata (TOYACr 10179).

***Synisoma pacifica* Nunomura, 1974**

**(Japanese name: Kuroshio-naga-heramushi)**

*Synisoma pacificum* Nunomura, 1974a, p. 6, figs. 4-5 (Hikigawa Town, Kii Peninsula).

*Material examined*: 1♂2♀♀, *Eisenia*-bed, Misaki-oohae, Ikata-cho, 12, Nov. 1976, coll. Kizo Nagata; 1♀, *Eisenia*-bed, Misaki-oohae, Ikata-cho, coll. Kizo Nagata.

***Euidotea ocellata* Nunomura, 1984**

**(Japanese name: Oome-heramushi)**

*Euidotea ocellata* Nunomura, 1984, p. 65, figs. 1-2 (off Mawaki, near Ushitsu, Ishikawa Pref.).

*Material examined*: 3exs, Off Misaki-cho, 24, Nov. 1976, coll. Kizo Nagata (TOYA Cr- 12467~12469).

**Acknowledgements**

I would like to express my sincere gratitude to The Kuroshio Biological Research Foundation (KBRF) for supporting to carrying out a series of survey on marine and maritime isopods of Shikoku District financially, and to Biodiversity Center, Ehime Prefectural Institute of Public Health and Environmental Science for giving me a chance to examine many interesting specimens.

My special thanks are due to Dr. Fumihito Iwase and members of The Biological Institute on Kuroshio (BIK) for their kindness in great help, to Dr. Kazuo Ishikawa, Committee for Surveys of Natural Environment of Matsuyama City, Matsuyama, Dr. Nobuo Tsurusaki, Tottori University and many scientists for giving many isopod specimens (mainly terrestrial species), and to Mr. Yamamoto of Yamamoto Institute of Forest Biology, and many scientists for their kindness for giving me a chance to examine many interesting specimens.

Last but not least gratitude to Mr. Minoru Tokumasu, for his kindness in examining the salinity of "Shiotorigawa"-the type locality of *Gnorimosphaeroma saijoense*.

**References**

- Ariyama, H. and M. Otani 2004. *Paracerceis sculpta* (Crustacea: Isopoda: Sphaeromatidae), a newly introduced species into Osaka Bay, Central Japan. *Benthos Research*, 59: 53-59.
- Budde-Lund, G. 1885. Crustacea Isopoda terrestri, per families et genera et species descripta. 319 pp. Copenhagen.
- Bruce, N. L. 1980. The systematics of some Japanese marine isopods (Fam. Sphaeromatidea) of the genera *Dynoides* Barnard, 1914 and *Cymodocella* Pfeffer, 1887, with descriptions of two new species. *Crustaceana*, 38(2): 199-211.
- Holmes, S. 1904. Remarks on the sexes of Sphaeromids, with a description of a new species of *Dynamene*. *Proceedings of the California Academy of Sciences* (3) Zoology 3: 295-306.
- Iwamoto, K. 1943. [Some terrestrial Isopoda from Japan]. *Dobutsu oyobi shokubutsu*, [Animal and Plants, 11(12): 17-32. (In Japanese).
- Jang, I. K. and Kwon, D. H. 1993. A new species of the genus *Gnorimosphaeroma* (Crustacea, Isopoda, Sphaeromatidae) from a brackish-water lake in Korea. *Korean Jour. Zool.* 36 (3): 402-407.
- Kim, H. S. and Kwon, D. H. 1985. The systematic study of the family Sphaeromatidae (Crustacea, Isopoda, Flabellifera) from Korea. *Inje Jour.* 1 (2): 143-165.
- Kensley, B. and Schotte, M. 2000. New species and records of anthuridean isopod crustaceans from the Indian Ocean Journal of Natural History 34: 2057-2121.

- Kussakin, O. G. 1979a. Marine and brackish Isopoda of cold and temperate waters of the northern hemisphere I, suborder Flabellifera. *Acad. Sci. U.S.S.R., Leningrad*, 1-472 (In Russian).
- Kwon, D. H. 1990. A systematic study on the Korean marine isopod crustaceans I. Flabellifera Part 2. Family Sphaeromatidae. *Inje Jour.* 8: 151-192.
- Kwon, D. H. 1995. Terrestrial Isopoda (Crustacea) from Cheju Island, Korea. *Korean Jour. Syst. Zool.*, 11(4): 509-538.
- Kwon, D. H. and Kim, H. S. 1987. A new species of the genus *Gnorimosphaeroma* (Crustacea, Isopoda, Sphaeromatidae) from the Naktong River, with a key to the Korean species of the genus. *Korean Jour. Syst. Zool.*, 3 (1): 51-56.
- Matsumoto, K., 1960. Subterranean isopods of the Shikoku District, with the description of three new species. *Bull. biogeogr. Soc. Japan*, 22:1-17.
- Matsumoto, K., 1962. Two new genera and a new subgenus of the family Asellidae of Japan. *Annot. Zool. Japan*, 35: 162-169.
- Matsumoto, K. 1963. Studies on the subterranean Isopoda of Japan, with notes on the well-water fauna of Japan. (Part 1). Studies on the subterranean Isopoda of Japan. (No. 1). *Annual Rept. Tokyo-to Lab. Med. Sci.*, 13 (Suppl.): 1-77.
- Matsumoto, K. 1966. Studies on the subterranean Isopoda of Japan, with notes on the well-water fauna of Japan. (Part 1). Studies on the subterranean Isopoda of Japan. (No. 2). *Annual Rept. Tokyo-to Lab. Med. Sci.*, 23: 77-103.
- Matsumoto, K., 1968. Studies on the subterranean Isopoda of Japan, with notes on the wellwater fauna of Japan (Part 1). Studies on the Subterranean Isopoda of Japan (No.3). *Rept. Tokyo-To Lab Med.Sci.* 26: I+103-115.
- Menzies, R. J. and Glynn, P. W. 1968. The common marine isopod Crustacea of Puerto Rico: A handbook for marine biologists. Studies on the Fauna of Curaçao and other Caribbean Islands 27 (104): 1-133.
- Menzies, R. J. 1962. The marine isopod fauna of Bahia de San Quintin, Baja California, Mexico. *Pacific Naturalist*, 3 (11): 337-348.
- Nishimura, S. 1968. *Gnorimosphaeroma lata* n. sp., a new marine isopod from Kii, Japan. *Publ. Seto Mar. Biol. Lab.*, 16(4): 273-280.
- Nishimura, S. 1976a. Redescription of *Leptosphaeroma gottschei* Hilgendorf (Isopoda: Sphaeromatidae), with some biological notes. *Publ. Seto Mar. Biol. Lab.*, 23(1/2): 169-177.
- Nishimura, S. 1976b. *Dynoidella conchicola*, gen. et sp. nov. (Isopoda: Sphaeromatidae), from Japan, with a note on its association with intertidal snails. *Publ. Seto Mar. Biol. Lab.*, 23(3/5): 275-282.
- Nunomura, N. 1974a. Marine Isopoda from the coast of Hikigawa Town, Kii Peninsula, middle Japan (1). *Bull. Osaka Mus. Nat. Hist.*, 28: 1-12.
- Nunomura, N. 1974b. A new anthurid isopod from the estuary of the Muromi River, northern Kyushu, Japan. *Bull. Osaka Mus. Nat. Hist.*, 28: 13-16.
- Nunomura, N. 1975. Marine Isopoda from the rocky shore of Osaka Bay, middle Japan (1). *Bull. Osaka Mus. Nat. Hist.*, 29: 15-35.
- Nunomura, N. 1977. Marine Isopoda from Amakusa, Kyushu (1). *Publ. Amakusa Mar. Biol. Lab.* 4(2): 71-90.
- Nunomura, N. 1983. Studies on the Terrestrial Isopod Crustaceans in Japan, I. Taxonomy of the Families Ligiidae, Trichoniscidae and Olibiridae. *Bull. Toyama Sci. Mus.*, 5; 23-68.
- Nunomura, N. 1984. Studies on the Terrestrial Isopod Crustaceans in Japan, II. Taxonomy of the Family Scyphacidae. *Bull. Toyama Sci. Mus.*, 6 1-43.
- Nunomura, N. 1986. Studies on the Terrestrial Isopod Crustaceans in Japan.III. Taxonomy of the Families Scyphaciade (continued, Marinoniscidae, Halophilosciidae, Philosciidae and Oniscidae. *Bull. Toyama Sci. Mus.*, 9:1-72.
- Nunomura, N. 1987. Studies on the Terrestrial Isopod Crustaceans in Japan, IV. Taxonomy of the Trachelipidae and Porcellionidae. *Bull. Toyama Sci. Mus.*, 11; 1-76.

- Nunomura, N. 1988. Description of *Nishimuraia paradoxa* gen. et sp. nov., and the first record of the genus *Paracerceis* in Japan (Isopoda: Sphaeromatidae). *Bull. Toyama Sci. Mus.*, 12: 1-7.
- Nunomura, N. 1990. Studies on the Terrestrial Isopod Crustaceans in Japan, V. Taxonomy of the families of Armadillidiidae, Armadillidae and Tylidae with taxonomic supplements to the other families. *Bull. Toyama Sci. Mus.*, 13:1-58.
- Nunomura, N. 1993. Marine Isopod Crustaceans of Seto Inland Sea deposited at the Toyama Science Museum-1. Suborder Anthuridea. *Bull. Toyama Sci. Mus.*, 16: 15-30.
- Nunomura, N. 1997. Marine Isopod Crustaceans of Seto Inland Sea deposited at the Toyama Science Museum. 2. Suborder Valvifera. *Bull. Toyama Sci. Mus.*, 30: 37-42.
- Nunomura, N. 1998. On the genus *Gnorimosphaeroma* (Crustacea, Isopoda, Sphaeromatidae) in Japan with descriptions of six new species. *Bull. Toyama Sci. Mus.*, 21: 23-54.
- Nunomura, N. 1999a. Taxonomical revision on some groups of terrestrial isopods in Japan. *Edaphologia*, 62: 81-91. The Japanese Society of Soil Zoology (in Japanese).
- Nunomura, N. 1999b. A new species of the genus *Gnorimosphaeroma* (Isopoda, Sphaeromatidae) from the mouth of Tonda Rive, Kii Peninsula, Southern Japan. *Bull. Toyama Sci. Mus.*, 22: 1-5.
- Nunomura, N. 1999c. Sea shore isopod crustaceans from Izu Islands, Middle Japan. *Bull. Toyama Sci. Mus.*, 22: 7-38.
- Nunomura, N. 2004. Marine isopod crustaceans from Izu Peninsula, Central Japan. *Bull. Toyama Sci. Mus.*, 27: 1-14.
- Nunomura, N. 2008. Two new Species of the genus *Lucasioides* (Crustacea, Isopoda) from Moles Tunnel of Nanto-shi, Toyama, Middle Japan. *Bull. Toyama Sci. Mus.*, 31: 3-11.
- Nunomura, N. 2010. A new Species of the genus *Lucasioides* (Crustacea, Isopoda) from nest materials of *Mogera imaizumii* Toyama-ken, Middle Japan. *Bull. Toyama Sci. Mus.*, 33: 33-37.
- Nunomura, N. 2012. Marine isopod crustaceans of Seto Inland Sea deposited at the Toyama Science Museum 3. Suborder Cymothoidea, Limnoriidea and Sphaeromatidea. *Bull. Toyama Sci. Mus.*, 35: 77-85.
- Nunomura, N. and Ikehara, K. 1985. Some isopod crustaceans collected in the middle coastal area of the Japan Sea. *Bull. Toyama Sci. Mus.*, 7: 51-63.
- Nunomura, N. & Nishimura, S. 1976. Marine Isopoda from the rocky shore of Osaka Bay, middle Japan (2). *Bull. Osaka Mus. Nat. Hist.*, 30: 19-26.
- Nunomura, N. and E. Yamamoto, 2000. Terrestrial Isopod crustaceans from Odamiyama and its neighboring areas, Ehime Prefecture, Shikoku, Japan. (*In* Oda-cho, Nature of Odamiyama I: 839-843.): 839-843(In Japanese).
- Poore, G. C. B. and Lew Ton, H. M. 1985. *Apanthura*, *Apanthuretta* and *Apanthuropsis* gen. nov. (Crustacea: Isopoda: Anthuridae) from south-eastern Australia. *Mem. Mus. Victoria*, 46: 103-151.
- Richardson, H. 1909. Isopods collected in the northwest Pacific by the U.S. Bureau Fisheries steamer "Albatross" in 1906. *Proc. U. S. Nat. Mus.*, 37: 75-129.
- Saito, N., Itani, G. and Nunomura, N. 2000. A Preliminary Check List of Isopod Crustaceans in Japan. *Bull. Toyama Sci. Mus.* 23: 11-107(in Japanese).
- Schmalfuss H., 2003. World Catalog of terrestrial isopod (Isopods: Oniscidea). *Stuttgar. Beitr. Naturk. Ser.A.* 654: 1-341.
- Schotte, M., Kensley, B. F. and Shilling S. (1995 onwards). World list of Marine, Freshwater and Terrestrial Crustacea Isopoda. National Museum of Natural History Smithsonian Institution: Washington D.C., USA. <http://invertebrates.si.edu/isopod/> (accessed March, 2013)
- Tattersall, W.M., 1921. Part. vii. Mysidacea, Tanaidacea and Isopoda. *In* Annadale N., Zoological results of a tour In the Far East. *Mem. Asiat. Soc. Bengal*, 6: 403-433.